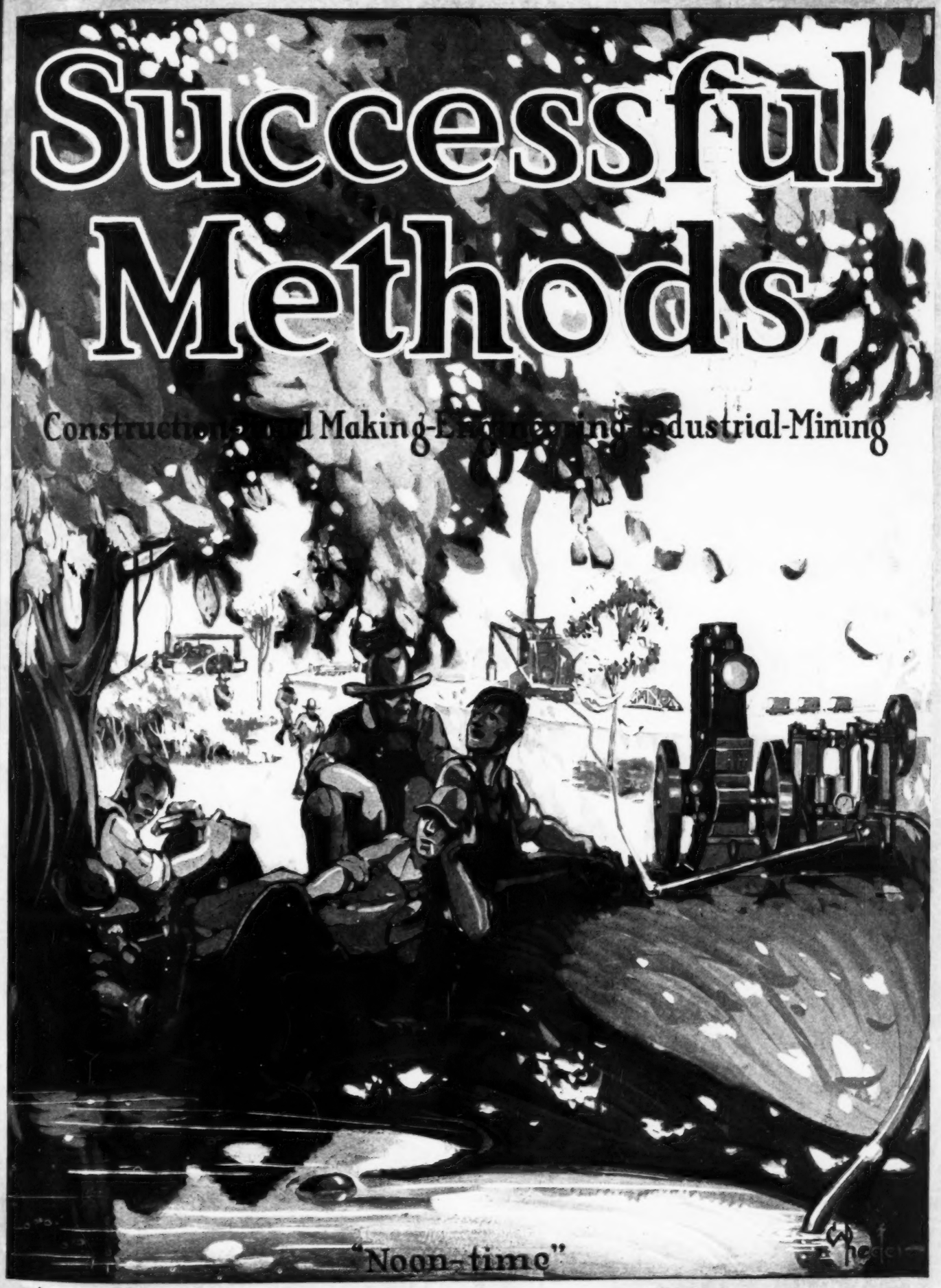
Successful Methods

Construction and Making-E[illegible]ing Industrial-Mining



"Noon-time"

VOL.2 August 1920 NO.8

Come to Headquarters *for* Construction Machinery

AT LAST! A time and energy conserving method of selecting construction machinery and securing information as to the work each machine does.

In the heart of New York City, a veritable department store for construction machinery—a complete service under one roof where definite information concerning the work done by the machines of the following manufacturers can be obtained readily and conveniently.

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Successful Methods

A Magazine of Construction Service

Published by
MANUFACTURERS PUBLICITY BUREAU
INCORPORATED
140 South Dearborn Street, Chicago.

Vol. II | August, 1920 | No. 8

NOONTIME

"Why do you have a cover showing a lot of men loafing?" inquired a rather caustic critic who saw the drawing for the cover of this issue of Successful Methods. "Don't you know," he continued in his best oratorical manner, "that the country's production is miles behind in everything? 'Produce! Produce! Produce!'—that's what you ought to tell them," he shouted until the windows fairly rattled.

But isn't Successful Methods doing just that by devoting its cover to a scene showing the men spending their noon hour in the shade of the trees that border a rippling brook while the sun blazes down on the unfinished road beyond? The morning's work is done and the afternoon is still before them.

Another noontime is at hand now. The construction season of 1920 has reached the half-way point. Its morning is over, but there is time enough in the afternoon to care for its own share and some of the things left undone in the morning as well.

So get ready for the afternoon months which will bring success or failure, depending upon how well you use them. Survey the situation as you stand at the half-way point and prepare to get busy. Make every hour of the afternoon count.

This Magazine Will Be Sent to Men Who Can Use It.
This Issue Has a Circulation of More Than 75,000.

EDITORIALS

The Why of the Car Shortage

IN ASKING the Editor of *Railway Age* to tell its readers something about the reasons for the failure of the railroads to deliver materials to contractors, SUCCESSFUL METHODS sought out a man who is recognized as an expert in his field. Samuel O. Dunn enjoys the confidence of railway executives and officials to a remarkable degree.

In the article which appears on pages 6 and 7 of this issue, Mr. Dunn does not hold out much hope for the contractor this season. The coal shortage in the Northwest is the great peril that the railroads are fighting just now. So alive are they to the danger of the situation that they are bending every effort to move coal to the threatened section. Everything else must wait.

Quite naturally, Mr. Dunn's point of view is the railway point of view. SUCCESSFUL METHODS does not take sides one way or the other. It presents Mr. Dunn's opinion as the opinion of an expert, whose statements of fact may be relied on implicitly because he knows whereof he speaks.

Illinois Isn't Quitting

EVERYONE is entitled to a hearing in SUCCESSFUL METHODS when he speaks on a subject in which its readers are interested. Early in the road building season this year, the great state of Illinois put on the brakes. Its action was heralded far and wide as a protest against high prices. So well was this idea advertised that other states followed the lead of Illinois and curtailed roadbuilding, announcing that they were going to wait until "prices became more reasonable."

On page 18 of this issue of SUCCESSFUL METHODS appears a letter from Clifford Older, Chief Highway Engineer of Illinois, in which he states that everyone has been under a misapprehension. Lack of materials, and not high prices, was the reason why Illinois curtailed its roadbuilding program.

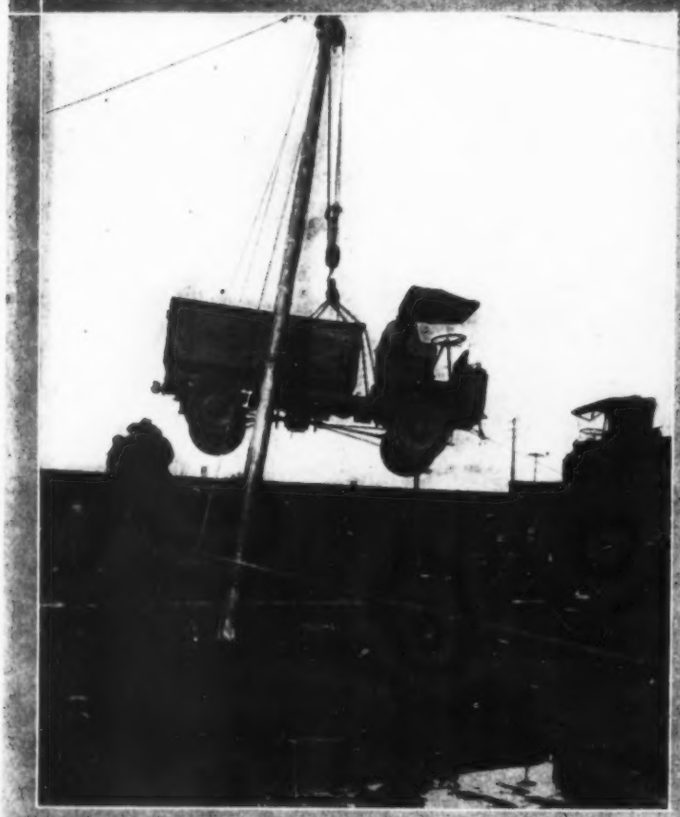
That is good news. It shows that Illinois is not quitting, but is doing all that it can do to build roads. Mr. Older's letter throws new light on a much misunderstood matter.

Building Roads in the Colorado Rockies

AFTER FORTY-EIGHT YEARS

Two views of a stretch of concrete pavement in Edinburgh, Scotland, laid in 1872. Hydraulic cement was used and like certain other Scotch products it has stood the test of time.

MEN AND MACHINES

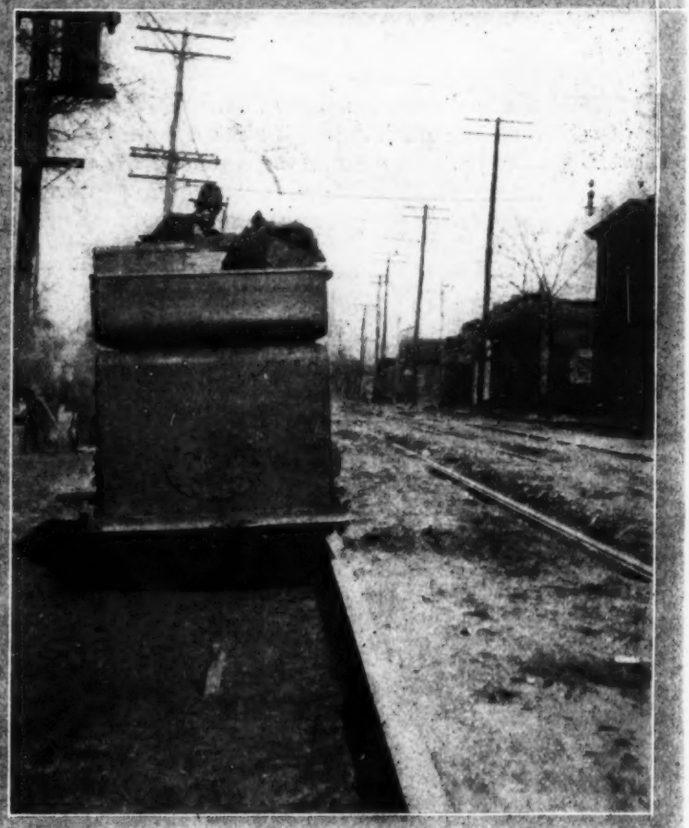


Above—Getting Material From a Tunnel Bin on a Road Job With Industrial Cars.

At the Left—How the Iowa State Highway Commission Solved the Problem Presented to It When Some Army Trucks Arrived in Open Top Cars.

Below—A Motor Sweeper on the Streets of Montgomery, Ala. The State Capitol Where the Confederacy Was Born in the Background.

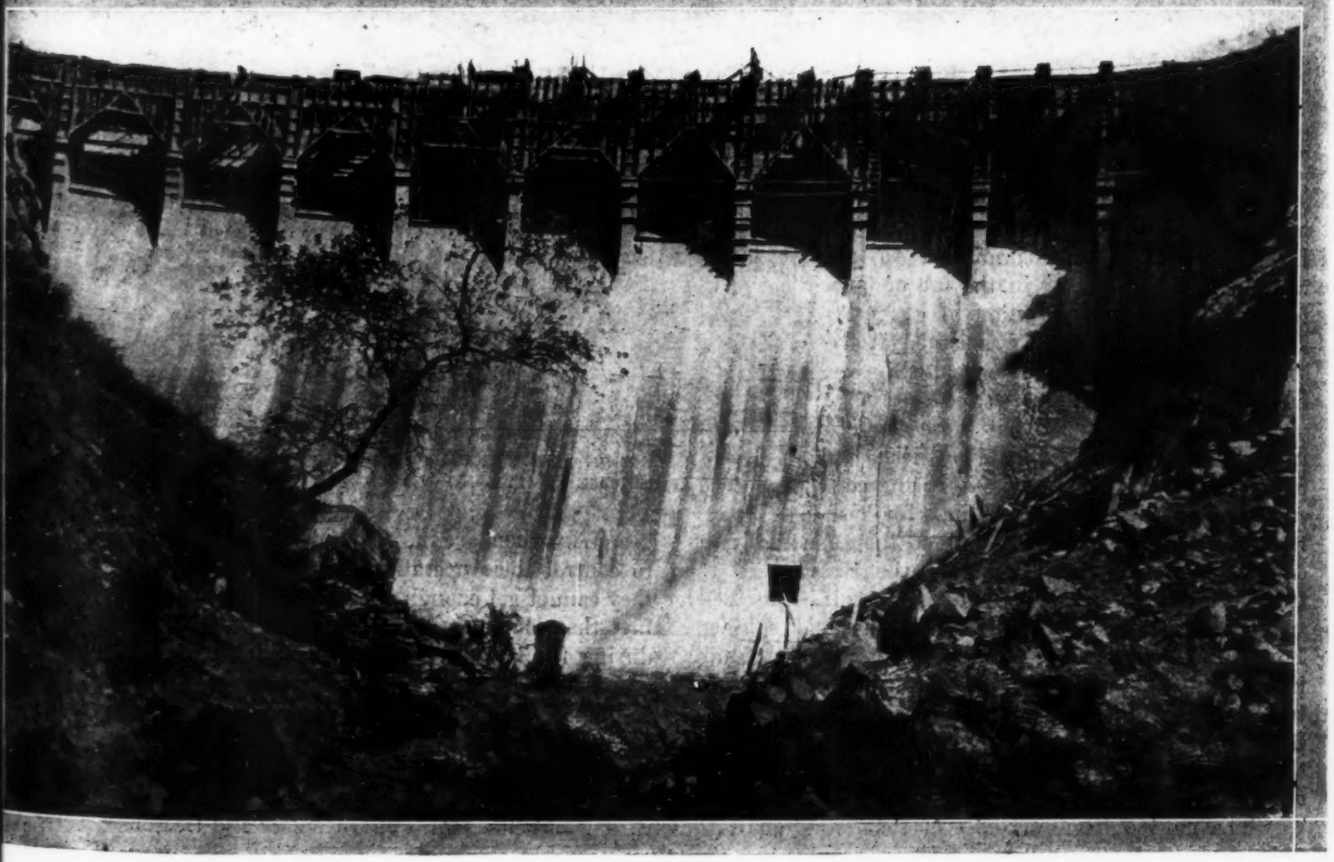
WORKING TOGETHER



Above—Someone Always Has Time to Look at a Steam Shovel. This One is Digging the Foundation for a Theatre at One of the Busiest Corners in Chicago.

At the Right—Rolling Close to the Rail. The Construction of This Roller Enables the Operator to Compact the Surface Right Up to the Trolley Track.

Below—One of the Big Jobs on the Pacific Coast—Devil's Gate Dam Near Los Angeles, 130 feet High, Nearing Completion.

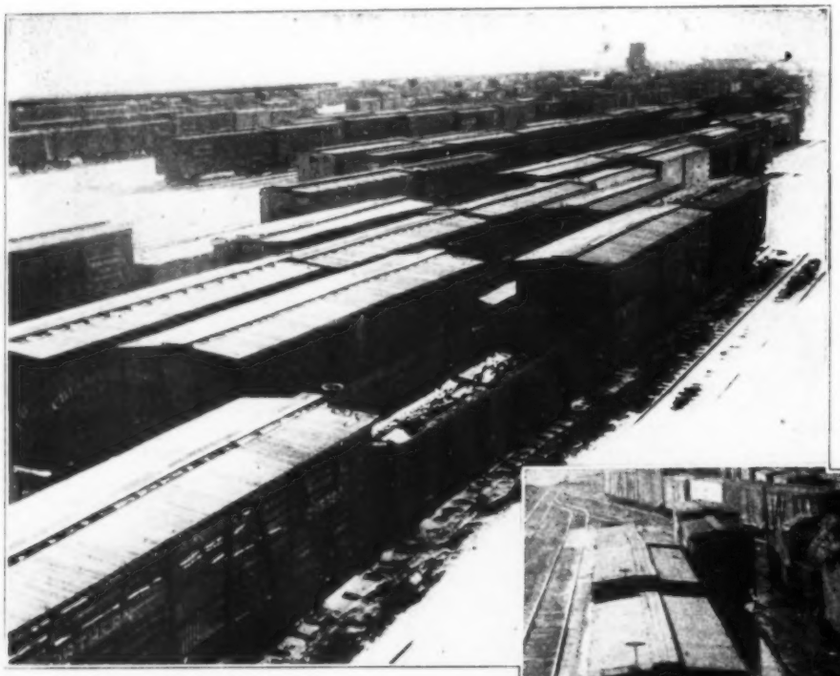


WHY CARS ARE SCARCE

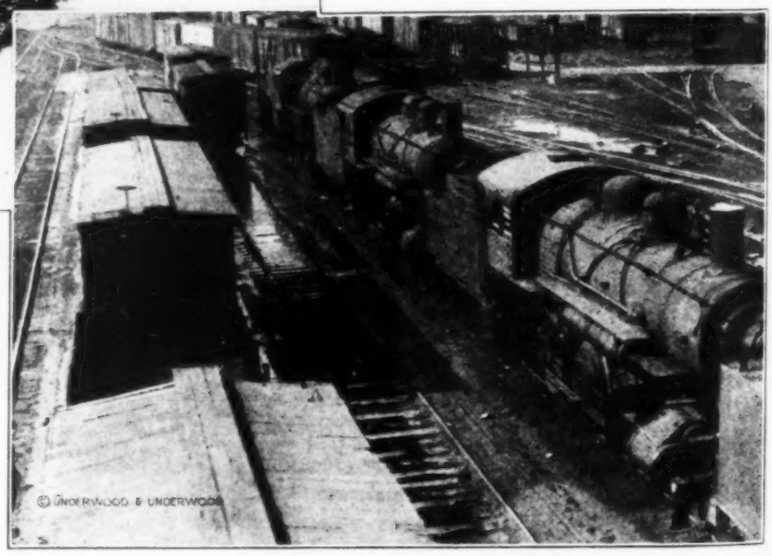
A Statement of Some of the Reasons for the Failure of the Railways to Deliver Materials to Contractors—Northwest Must Get Coal

By Samuel O. Dunn
Editor, Railway Age.

PERSONS and concerns engaged in the various kinds of construction work find themselves confronted with heavy losses, or even ruin, because they cannot get enough cars in which to ship sand, gravel, cement and other materials necessary for carrying on their business. The inability of the railroads to handle all the business offered to them. This condition is partly due to the "outlaw" railroad strikes which began late in March and have continued periodically ever since. But the effects produced by the strikes, while serious, are less serious than might have been expected. In every week since they began, except two in April, the railroads have moved more freight than in the corresponding week of last year. In the four weeks ended June 26 they moved 3,405,500 loaded cars, as compared with 3,237,406 in 1919. In the first six months of 1920 they moved more freight than ever before in the corresponding six months except in 1917 and 1918. With respect to bituminous coal, up to June 26 they had moved 41,313,000 tons more than in the same months of 1919, and more than in the corresponding period of any year except 1917 and 1918.



ONE CAUSE OF THE TROUBLE—CARS TIED UP IN THE YARDS DURING THE SWITCHMEN'S STRIKE LAST MARCH.



ANOTHER REASON FOR FREIGHT CONGESTION—WORNOUT LOCOMOTIVES RETIRED WITH NO NEW ONES TO REPLACE THEM.

immediate cause is an order issued by the Interstate Commerce Commission to the railways to give priority in the use of open top cars to the transportation of coal. As is well known, this order was issued at the solicitation, not only of the coal shippers, but also of the railways.

It is not unnatural that those engaged in construction work should criticise the policy adopted. There is need for the construction of thousands of buildings for business and housing purposes, and of thousands of miles of good roads. What, then, are the reasons for the transportation policy adopted, and how can it be justified?

The writer holds no brief for the coal shippers. For years they have been as unreasonable and unfair in their attitude and utterances regarding railway matters as any other class of shippers in the United States. But the transportation situation must be considered in its relation to the welfare of the nation as a whole.

The most outstanding fact of that situation is the

Why, then, are industries of many kinds being forced to control their operations, or even close down, because they cannot get enough cars? The condition is due to the fact that, during a long period of years, and especially during the last six years, the productive capacity of the other industries of the country has increased much more in proportion than the transportation capacity of the railroads. Why, in particular, is it necessary to give priority to the transportation of coal? This is partly due to the effects of the coal mine strike, which prevailed almost throughout the months of November and December, 1919,

and, as a result of which the country entered 1920 with its stored supplies of coal greatly depleted. It is even more due to the fact that the demands of the country's industry and people for coal, and the capacity of the mines to produce it, have been for years increased more than the capacity of the railways for transporting it.

In the minds of the railway officers who have studied the conditions, there is no doubt that there is at present a serious shortage of coal and the danger of a much greater shortage next winter, especially in the Northwest. They believe that unless every effort is made to transport coal many industries will not have enough of it to operate next winter, and many families will not be able to keep warm. They believe that, as between moving materials with which to build roads and buildings for use next year and in future years, and moving coal imperatively needed for this year, they have only one choice. Hence, their agreement with those who favor the drastic policy of giving priority to coal.

There is one feature of this priority policy regarding which I believe industries that are being deprived of transportation by it have just ground for bitter complaint. It results in giving priority to coal, whether it is to be used for the essential purpose of keeping people warm and keeping essential industries running, or is to be used in non-essential industries, such as moving picture shows, piano manufactories, passenger automobile manufactories, and so on. Certainly, the country needs the transportation of material for building houses and roads much more than it needs the transportation of coal to keep movie shows or piano manufactories going, and if there is at present any power in the government to shut off the movement of coal to non-essential industries and thereby make available more cars for the construction industry, that power ought to be exercised. The railroads, however, have no legal authority to discriminate between essential and non-essential users of coal, and I do not think even the Interstate Commerce Commission has.

The question naturally arises as to why the productive capacity of the industries of the country has increased so much more than the transportation capacity of the railroads. There is no mystery about it. When the state and national railroad commission began making arbitrary and drastic reductions in railway rates and earnings in 1906 and 1907, the public was warned that this policy would reduce the ability of the railways to provide facilities, and, if persisted in, would cause national disaster. In 1910 the railways asked for general advances in rates because of increasing expenses. They were denied. They again asked for general advances in 1914. Most of these were denied, although the percentage of net return earned on railroad property investment had declined since 1910 from 5¾ per cent to 4 per cent, and the annual investment made in railroad properties had declined from about $800,000,000 a year to about $400,000,000 a year. The eastern lines again asked for advances in rates in 1917. They were given only one-half of what they asked for, although the annual investment in railroad facilities had dropped in 1915 and 1916 to less than $300,000,000 a year. Finally, at the beginning of 1918, government operation of railways was adopted. During the two years of government control the additions made to equipment and other facilities were even less than they were in the later years of private operation.

The country persisted for years in a policy which, it was daily, and almost hourly, pointed out would have certain effects, and now many persons who supported this policy express astonishment and indignation because it has produced the effects they were told it would.

Shippers who really wish to help remedy the situation will load every car they can get to its maximum capacity, load and unload all cars as expeditiously as possible, favor giving the railways rates sufficient to enable them to begin at once raising the vast amounts of new capital they require, and indulge in a minimum of clamor against the railway managements because they do not do things which conditions, for which they are not largely responsible, render it impossible for them to do. Ignorant and unjust attacks upon the railways in the past, many of them inspired by business men for purely selfish reasons, have contributed greatly toward creating the present transportation situation. The same kind of thing in future will produce the same kind of results.

GEN. MARSHALL TO MANAGE CONTRACTORS ASSOCIATION

THE Associated General Contractors, which now numbers on its membership roll 700 construction firms representing 36 states and 150 cities scattered through the country, has created the office of General Manager, and Brigadier-General R. C. Marshall, Jr., former chief of the Construction Division of the United States Army, has been appointed to the new position.

Gen. Marshall began his service in the army as Captain of Volunteers during the Spanish-American war in 1898. In February, 1918, he became officer in charge of the Cantonment Division and in June of the same year, he was commissioned Brigadier-General and Chief of the Construction Division. While holding this position he was responsible for all building construction done by the War Department involving an expenditure of more than $800,000,000 and including a great variety of projects. As a result he came into contact with engineering, contracting and labor conditions all over the country. At the conclusion of the war he was awarded the Distinguished Service Medal for his efficient work. His citation reads: "For exceptionally meritorious and conspicuous service in the Construction Division of the Army. His zeal, judgment, and exceptional administrative ability have enabled serious difficulties to be overcome and the construction necessary for a great army to be provided."

Gen. Marshall's headquarters will be in Chicago at the offices of the Associated General Contractors, but he will spend considerable time in the New York and Washington offices and in traveling about the country.

MORE THAN MODERN

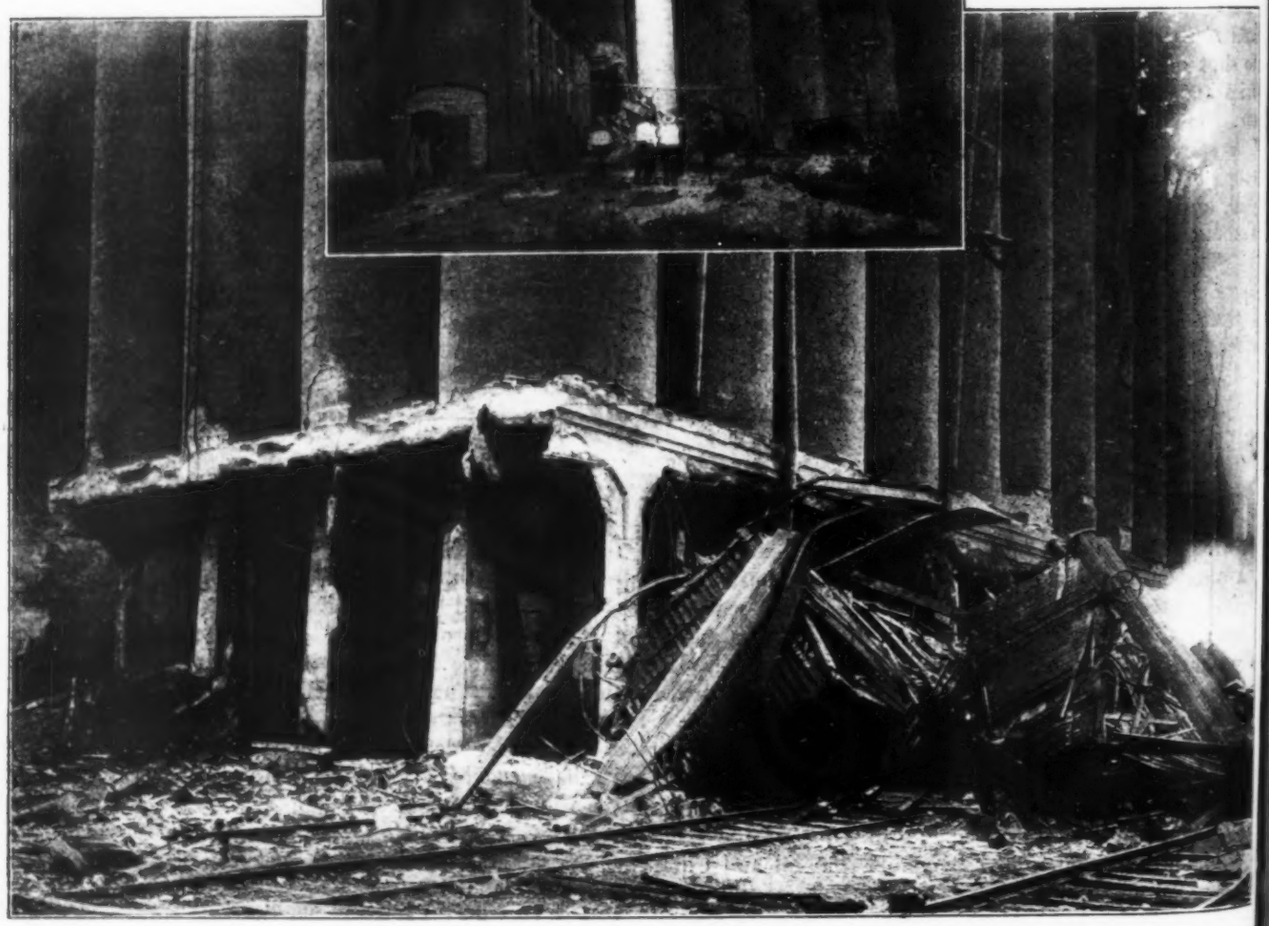
The Northern Central Elevator at Baltimore; A Structure That Is Ahead of the Times

By Jay Williams

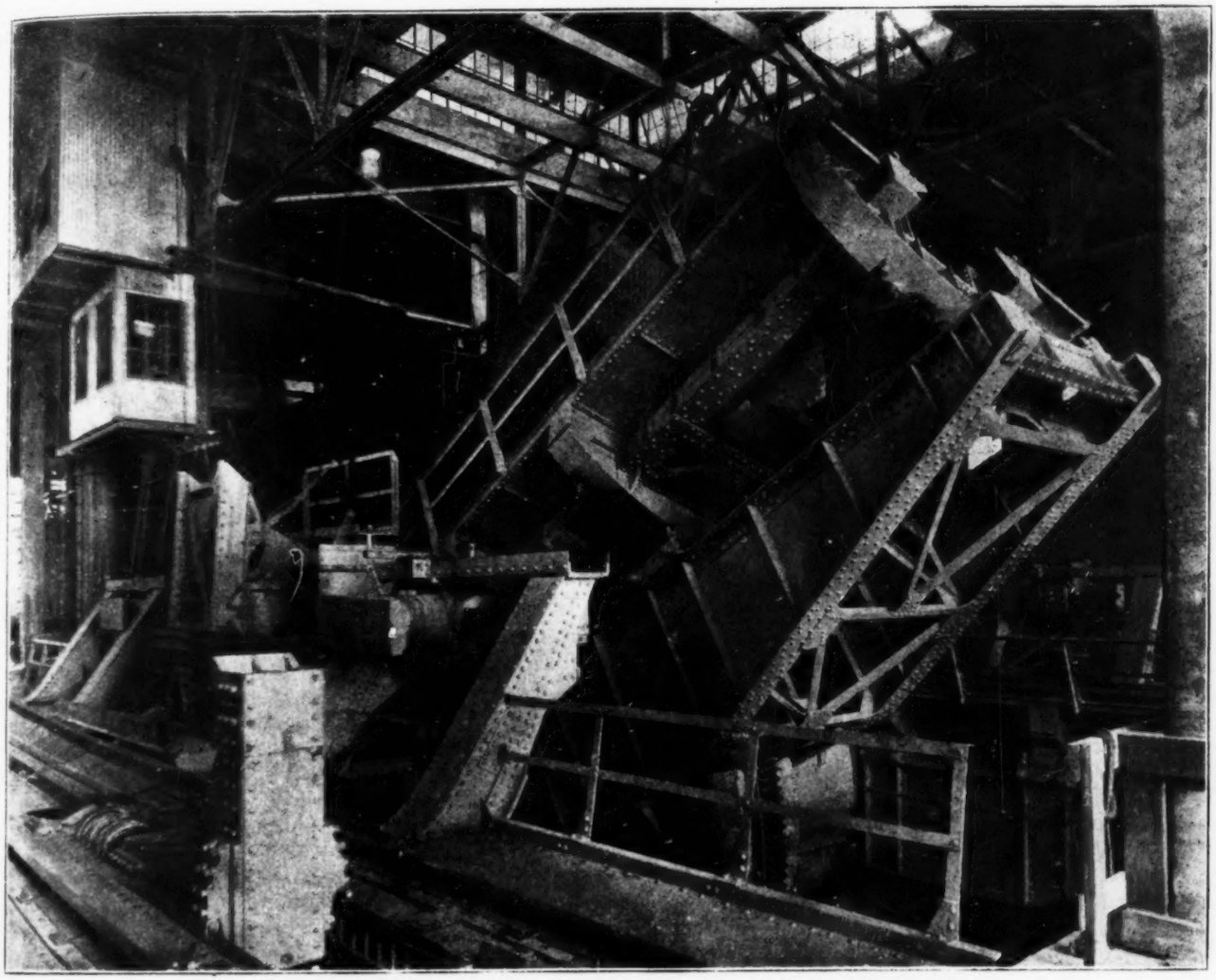
ORDINARILY Successful Methods concerns itself with methods of construction. What happens to a structure after it is completed, how it is used, and the part it plays in the great field of industry, are usually matters in which this magazine's readers are not so keenly interested. But, now and then, the usefulness and success of a structure are so directly dependent upon the methods used in constructing it, that a discussion of one leads into a discussion of the other.

The subject of this article, the Northern Central Grain Elevator of the Pennsylvania Railway at Canton, on the Baltimore waterfront, is a case in point. Any attempt to tell how it was built unfailingly leads into a description of what it does now that it is built, of the successful—and in many cases new—methods of grain handling which put it in a class by itself, several long jumps ahead of the times. To speak of it as thoroughly modern does not tell the story. The expression is inadequate. It is more than modern.

The Northern Central Elevator is the largest on the Atlantic Coast, but that fact is relatively unimportant. Its quality is what makes it great, not its quantity. It was built by James Stewart & Co., under the direction of W. R. Sinks, manager of the Stewart organization's grain elevator department, and work is still in progress on additional storage tanks which, when com-



WHAT A DUST EXPLOSION DOES TO A GRAIN ELEVATOR. THE WRECK OF AN ELEVATOR AT KANSAS CITY. NOTE HOW THE WALLS ARE BLOWN OFF IN THE UPPER PICTURE. DUST DID IT.



ONE OF THE FOUR GIANT UNLOADERS WITH A BOX CAR ON IT.

pleted, will give it a total capacity of 5,000,000 bushels.

It is built almost entirely of concrete, and that is one of the points in which the methods of construction and successful operation are so entangled that they cannot be separated. A few words about the peculiar nature of grain elevators, and the ever-present dangers which attend their use, will explain the foregoing statement.

Handling grain is a dusty job, for, every time the grain is moved, a little more dust is shaken loose. And grain dust is dangerous; it explodes. Therefore, a method of construction which keeps the dust from finding lodgment here, there and everywhere, and reduces the danger of a disastrous explosion to a minimum is the most successful. That is where concrete scores. Its use makes it possible to build elevators with few ledges and sills, few beams and other similar dust catchers. Steel frame elevators are still being built, but it only requires a brief glance into one of them and a look at the maze of beams and girders, with their convenient angles for dust collecting, to realize how good a piece of work the Northern Central Elevator is. There the dust can collect only on the floor and almost nowhere else. Sweeping it up at frequent intervals is an easy task when it lies ready for the broom instead of being hidden away in nooks and crannies ready to float forth and form part of a great explosion.

Placing the concrete at the Northern Central Elevator involved some rather difficult feats. For example, at one point it was necessary to chute the concrete about 720 feet. To do this, the concrete had to be carried to the top of one tower, chuted to the base of another, and then delivered through a long chute suspended over the water, two views of which are shown on Page 11.

Such methods as that just described made the work of construction a success. Now comes the turn of the methods which are making the operation of the elevator a success. First and foremost are the four great car unloaders, mechanical monsters of a new species, the like of which never before has been seen. They pick up a box car almost bursting with its load of grain, tip it this way and that while the grain rushes out with a roar like a waterfall, and in less time than it takes to write about it, restore the car to an upright position all safe and sound, and, after pushing it along, are ready for the next one.

In language a little more technical, the work of the unloaders may be stated as follows: The car is run upon the unloader. When the operator in the cage overhead gives the "go ahead" signal, he starts a motor which causes two clamps to rise from between the rails and press tight against the couplers at both ends of the car. The next move is to operate two side supports which press against the side of the car a few feet from the ends. When these are in place the car is tipped sideways to an angle of 30°, while at the same time a mechanical door opener is pressed against the grain

door, which is pushed inside the car as it tips. The pushing in of the grain, door which remains intact, releases the grain which begins to pour into the hopper beneath. To accelerate the flow, the car, still inclined sideways at an angle of 30°, is tipped endways as well, to an angle of 45°, if necessary. It is then tipped endways in the other direction, the grain rushing out first from one end and then from the other. When the grain has run out, the little which is left is cleaned out with an air hose while the car is being brought back to its original position. The car is then released and pushed out by the next car, as the latter takes its place on the platform of the unloader. The photograph probably will give a clearer idea of the way it works than any written description can.

"Does such a big machine pay?" is a question that has been asked more than once by those who have had the opportunity to see it since it was put to work only a month ago. Here are some facts and figures which answer conclusively the question with which this paragraph begins.

There are 4 unloaders at Baltimore, and at present it takes three men to handle one, although ultimately the number may be cut to two. That makes 12 men to operate 4 unloaders and at normal speed it is easily possible to unload 240 cars in an 8-hour day. The whole operation of unloading a car has been performed repeatedly in 7 minutes.

Another big grain elevator in this country employs 88 men working with the old-fashioned, but up till now, modern, grain car shovels, which are operated by a clever device which pulls the shovel through the grain to the door of the car. These 88 men, by working all day, can unload almost as many cars as the 4 unloaders operated by a dozen men. Does that answer the question, in these days of high-priced labor?

There is another item, too, that was all but forgotten. At present prices it costs about $11 to cooper a grain car, that is, to put up the grain doors inside the regular door. The popular method of getting them out of the way is to take an axe and crow bar and chop them away, regardless of cost. As a matter of fact, there was no other effectual way of releasing the grain. But the unloaders have put an end to that sort of wanton waste, so far as the Northern Central Elevator is concerned. They pick up the grain door intact, hold it until all the grain has run out, and then deposit it, as good as ever, on the floor of the car. There is a practical dollars and cents saving that anyone can see and understand.

But the car unloader is only one of a number of refinements in methods of operation at the Northern Central Elevator. The others are less spectacular, but, nevertheless, do their share to make the handling of the grain as efficient and inexpensive as is humanly possible. The easiest way to tell about them is to follow the grain from the cars up through the "house" into the storage bins, and from there into the ships that take it across the Atlantic. Like all the other elevators on the seaboard, the Northern Central exists for the purpose of transferring grain from car to ship and for storing it while awaiting vessels to take it away.

From the hoppers into which the grain is dumped by the car unloaders, it is carried on belt conveyors to the boot of the leg, which is the technical term for the elevating mechanism consisting of buckets on an endless belt. The legs—there are 19 of them, each 220 ft. in height—take the grain up to the garners in the top of the house. In most elevators the legs are driven by a rather complicated rope drive which takes up considerable valuable space, and requires the installation of special devices to keep the ropes at the right length despite the changing conditions. At Baltimore, the belts are driven directly by individual motors and also are equipped with automatic takeups and stops. These are real factors in the elevator's safety system, because, in the past, many explosions have been caused by the choking of the legs, with a resulting generation of heat by the revolving driving mechanism. That cannot happen in Baltimore. The moment a leg chokes, the automatic stop does its bit, and everything comes to a standstill.

To return to the grain. The garners, into which it is discharged by the legs, are bins which hold the grain from one car while that from the previous car is being weighed. In a grain elevator every bushel is weighed, the superintendent is like a banker, and at the end of the year every bushel taken in must be accounted for, either as paid out or still held in storage. Therefore, it is necessary to keep the various carloads separate until they have been weighed.

The big scales, and there are 23 of them, weigh the grain at the rate of 2,000 bushels at a time. A signal system of lights operated by the grain dispatcher from his office where he can tell at a glance what every unloader, conveyor, leg, scale or spout in the elevator is doing, as well as the condition of the storage bins, tells the weigher when and where to discharge the grain from his scale. It may be sent to one of three places: into the storage bins, directly into the ship, if one is waiting, or back to the cars. That is up to the grain dispatcher, who governs his actions by the needs of the moment.

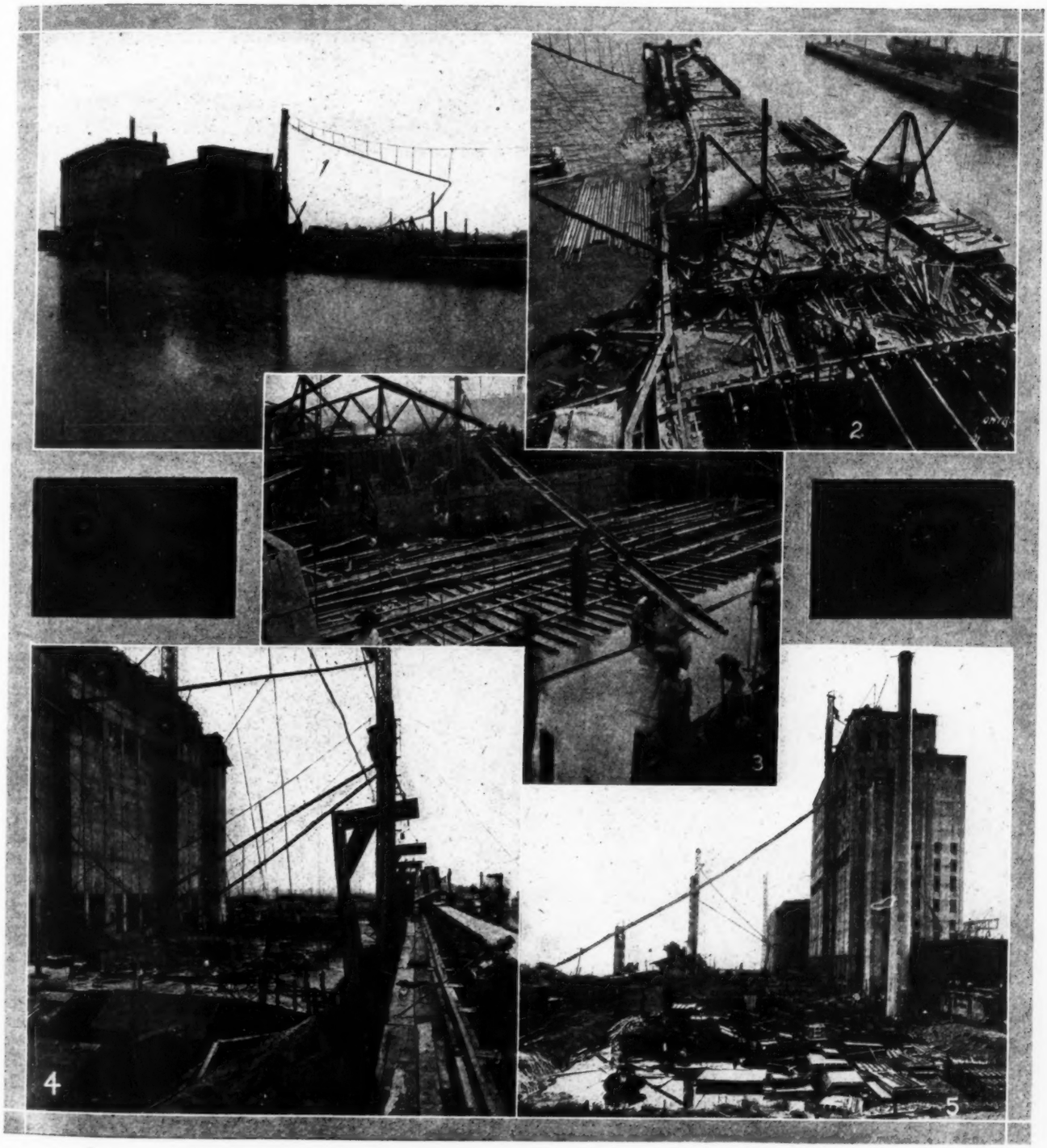
If it is sent to storage, the grain is discharged by spouts to belt conveyors which carry it to any one of the storage bins, or tanks. There are two kinds of storage bins: the big, circular ones which hold 13,000 bushels each, and the interstitial bins which very cleverly utilize the spaces between the round tanks. Storage space is not wasted in a modern grain elevator.

A few words about the construction of the tanks may be of interest. In the ordinary building the pressure downward on the floors and foundations is the only pressure that has to be considered. In a grain elevator it is a different story. The lateral pressure is enormous, varying with the different kinds of grain. Flax and peas, the former because of the slippery character of the kernels, and the latter because they roll so readily, exert the greatest pressure on the sides of the tanks in which they are confined. And as a tank may be used at any time for any sort of grain, it has to be made strong enough to hold flax or peas. Then it will have no trouble in taking care of the others.

In order to withstand the lateral pressure, the tanks are built of concrete in circular form, reinforced by steel rings, like hoops on a barrel. As wheat weighs about 50 lb. to the cubic foot, as opposed to about 62 lb. for water, the necessity for strength can be understood easily.

So much for the big storage tanks. It frequently happens that the grain, after being weighed, is not put

SOLVING CHUTING PROBLEMS AT THE NORTHERN CENTRAL ELEVATOR



1. A portion of the long chute used for building the pier. 2. Another view from the top of the elevator showing a portion of the chute over the water. 3. Placing the concrete for one of the conveyor tunnels. 4. A good view of the chuting layout while the "house" was being built. The conveyor on the right carried the materials to the mixer. 5. A wood chute. Built of wood and used for disposing of wooden forms after they had done their work.

in storage, but is sent directly to the ships. In such cases it is discharged from the scales into the shipping bins and from them into the discharging spouts. In the construction of this spouting system, the elimination of dust was kept in mind. The spouts are all enclosed, and hoppers are provided which break the fall of the grain half way down, thus reducing greatly the amount of dust. Gravity and belt conveyors attend to the task of getting the grain into the ship.

The drying house has not been mentioned in the foregoing chronicle of the progress of the grain through the elevator because it isn't always needed. Some grain behaves so well that it doesn't need a trip to the dryer. A separate building handles this department, in which the grain is sifted through bins so constructed that both hot and cold air can be blown through it. At any time grain can be taken from the storage tanks, dried or cleaned, and then returned to the tanks or sent to a ship.

That about covers the high spots, and there isn't space enough for a detailed description of all the many ways in which safety, efficiency and economy are obtained at the Northern Central Elevator. There is one thing more, however, that must be mentioned. That is the fire alarm system. Even though everything possible had been done to prevent fire, the builders didn't overlook the necessity of getting right after it, if it should break out. The telephone system is the fire alarm system, and the fire signal is 00. That doesn't mean that you have to call up a central operator to report a fire. Nothing as crude as that. You just take down the receiver, call 00, and the fire pump starts, the alarm rings and the fire fighting forces go into action. Simplicity and safety again—the twin virtues that keep cropping up throughout the mighty establishment.

ROADS AND STREETS IN CHILE

By S. T. Henry

CHILEAN cities have an amount of good pavements that is surprising to the American engineer visiting them for the first time. Antofagasta has a number of miles of asphalt and bituminous macadam laid on concrete base, that is as good work as will be found anywhere. Valparaiso has many miles of excellent asphalt and granite block paving laid on concrete base. Santiago, with a population of about half a million, probably has as much good paving as any American city of the same size had until recently. Several other cities also have considerable amounts of various classes of pavings. In Santiago granite block paving on concrete base, with the joints filled with cement grout, has been reduced to an art.

Outside of the cities little road improvement work has been done in Chile. A law recently passed will result in a considerable amount of road improvement in the next few years. On account of the rugged mountainous character of the country, railway construction is very expensive. Many sections of the country also have not yet been developed to the extent that railway lines serving them could be made to pay. Sand, gravel and good rock for highway work are available almost everywhere. Cement and bituminous material must be imported. Some cement is made locally, but the quantity would be quite insufficient to meet the demands that will be brought about if any considerable amount of permanent road surfacing is done.

HEWN FROM SOLID ROCK. A SEASHORE ROAD IN CHILE.

GRANITE BLOCKS ON CONCRETE BASE IN SANTIAGO.

The photograph printed at the bottom of the opposite page shows a typical view on a road about 10 miles long that extends along the seashore from Valparaiso to Con-Con, a summer resort. This road was literally hewn out of the solid rock. It offers some quite wonderful views of the sea and the mountains. It has not, however, been surfaced, so that it is unsatisfactory for motor traffic.

The photograph at the top of this page shows a cement grout filled granite block pavement on concrete base in Santiago. This pavement has been down more than five years. It is subjected to a large volume of heavy two-wheeled carts, on which loads as great as 6 tons are carried. The surface is in excellent condition, however, and the life of the pavement appears to be quite indefinitely long when the time it has been down and the heavy traffic are considered.

ROBBING THE JUNK PILE

How an Old Mixer was Rescued from Retirement and Put to Work

By V. H. Wilkes

FEW persons realize the amount of material scrapped on the average construction job that could be salvaged if a little thought and study were exercised, which in these days of high prices and scarcity of material is worthy of consideration.

The writer, who has charge of the construction plant and storage yard for one of the largest engineering corporations in the East, was endeavoring to clean up the congested condition of its yard and discovered under some tarpaulins a number of kegs of nails which had been shipped into the yard upon completion of work and return of equipment, which were the accumulation of a number of jobs.

Upon investigation it was found that practically all were badly rusted and not fit for use in this condition. During the further investigation of the equipment an old 10 cu. ft. concrete mixer with gasolene engine was noticed which was in such condition that it would not mix concrete or pay to repair. After issuing orders to retire this mixer to the scrap heap it was decided that the outfit might possibly be put to some use as a rattler or tumbler for the purpose of cleaning the rusted nails. Without cutting out any of the mixing blades or changing the drum in any manner about three kegs of nails, a quantity of iron borings and rough dry sand were put through the mixer with a result that approximately 3,500 pounds of nails were salvaged and have since been used on construction work. The machine was operated exactly as a mixer except when discharging a sieve was placed under the discharge chute which separated the nails from the iron borings and sand.

This plan proved so successful in cleaning the rusted nails that a considerable quantity of cast iron inserts, universal form clamps, bolts and numerous items have been cleaned and rescued from the junk pile.

If it is necessary after cleaning any material by the above method to store until such time as it can be used it is a good plan to put it through the machine the second time, using instead of iron fillings and sand a quantity of sawdust saturated with a cheap form of oil which will oil up the articles cheaper and better than when applied by hand.

"LOVE KEEPS HIS EYE ON THE BALL"

WHEN a construction organization grows so great that it has dozens of jobs going on at once in every section of the country, it is a self-evident fact that the executives who sit behind their desks in the home office are not the only big men on the payroll. Without detracting one bit from the credit that is due these executives, it is safe to say that the men out on the job in active charge of construction are just as important to the organization and just as worthy of recognition.

This is why SUCCESSFUL METHODS has selected for its series of biographical sketches of big men in the construction field a man now holding an executive position, whose work thus far has been done as a unit of a big organization. If Joseph Franklin Love had been in business for himself for the last twenty years, he would have made his mark as a successful contractor. And that is enough to earn for him a place on this page.

JOSEPH F. LOVE

"Joe" Love is a New Englander by birth, and a wanderer about the United States by occupation. Just at present he lives in Pittsburgh and is in charge of all outside construction work for the Mellon-Stuart Company. And as a result he is now sitting behind a desk most of the time, and probably wishing about ten times a day that he could get out on the job.

But to return to his beginnings in New England. He was born in Lawrence, Massachusetts, and got his first job in Haverhill, Massachusetts. Kelly Brothers, builders and general contractors, were his first employers, and he has no hesitation in stating that he began as a timekeeper and soon became a bricklayer. Probably that is one of the reasons for his success in later years. The man who has been through the mill himself knows how to handle men when he reaches a position of authority.

From timekeeper and material man to bricklayer, and from bricklayer to foreman were some of the steady steps in "Joe" Love's career, and, while he was taking them, he was absorbing more than his fair share of knowledge of the details of the construction business. That is, more than his fair share, if you compare the amount he absorbed with that picked up by his fellow workers.

Along in 1906, Stone & Webster found him out and added him to their long list of good men. He spent the next twelve years as a member of that organization in entire charge of jobs in various sections of the country. His first important job as a Stone & Webster man was the building of a power station at Terre Haute, Indiana. He was pretty far from home, but he knew the construction business, and his knowledge proved just as good in Indiana as it had in Massachusetts. With the Terre Haute job he began a pleasant custom, which he has maintained throughout his career. He finished the work ahead of time. In the remainder of this article it will not be necessary to mention that any particular job was finished ahead of schedule. With "Joe" Love in charge, that is understood.

For a number of years, Mr. Love concentrated to a large extent on power stations. He built the Boston Electric Power Station at City Point, South Boston, a really big affair that took a year to complete. In speaking of power stations, one does not mention the area of the building nor the number of cubic yards of material that went into it. The usual method is merely to mention the kilowatts capacity per hour it can produce, and everyone familiar with the subject knows at once just how big it is. The South Boston station was a 60,000-kilowatt installation.

Another interesting job was the Riverside Power Station in Savannah, Georgia, built in 1912. It wasn't as big as the Boston station, but it presented several unusual problems, one of them being the construction of the intake under air pressure. But "Joe" Love solved the problems and, when the work was done, Charles A. Stone decided to look it over in person. He went to Savannah, inspected the station from top to bottom and then sent to the home office in Boston a telegram about "Joe" Love, which so pleased the men back home that they had it framed and hung on the wall. "Love certainly keeps his eye on the ball," was Mr. Stone's brief but forceful comment.

It would take too much space to tell of all the big jobs that Mr. Love handled for Stone & Webster. There was the General Electric job in Schenectady where he put up two of the largest reinforced concrete buildings in the country at that time; the industrial plant for the Standard Textile Products Company at Peekskill, N. Y.: and the great Midland warehouses in the central manufacturing district of Chicago, S. Scott Joy, architect. These warehouses deserve more than a passing mention.

They had to be built without disturbing traffic, and, by the time the third story was reached, the first two were being filled with several million dollars' worth of merchandise. The traffic snarl that threatened would have tried the soul of a veteran traffic cop, but "Joe" Love took hold, ironed things out and kept his materials coming through without interfering with the flow of merchandise to and from the warehouse. When the work was all done and the cost figured up, it was found that its cost per cubic foot was less than that of any building of similar magnitude erected by the Stone & Webster organization. And it was done in 1915-1916, when prices were rising fast.

Mr. Love left Stone & Webster to take charge of a manufacturing organization, but had the rare wisdom to realize that construction problems and manufacturing problems are very different. Although others were inclined to disagree with him, he insisted that his place was in the construction field, where he had spent most of his life and back he went.

He joined the Mellon-Stuart forces in the executive position, which he now holds, about a year ago. He knows construction costs as well, if not better, than any other man in the construction field; he has a record behind him that speaks for itself—and, more than that, speaks for *him* in no uncertain terms.

SAVING MAN POWER

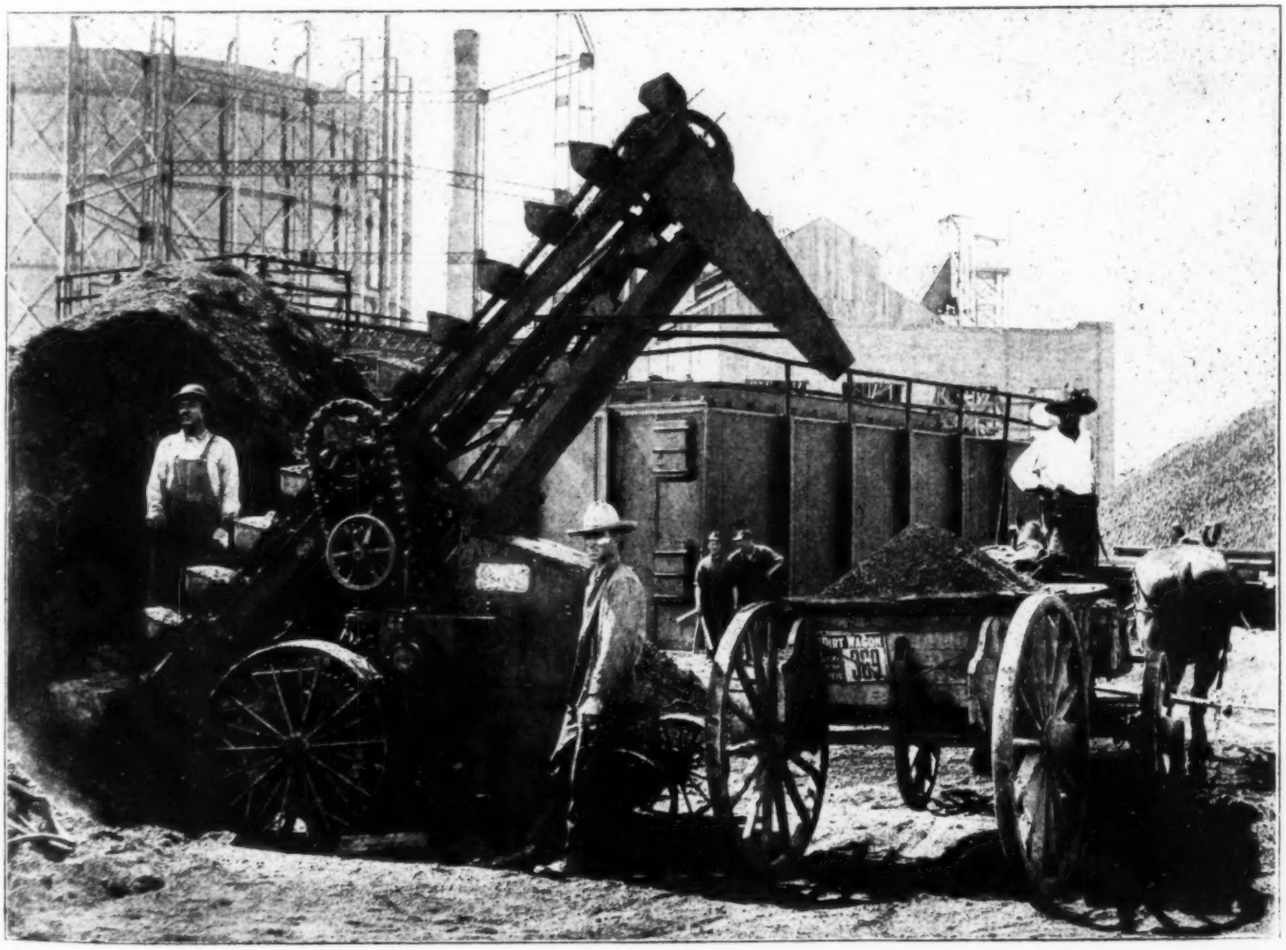
Machine Releases a Dozen Men for Other Work at Gas Plant in Detroit

AN unusual sort of work is being done efficiently by a self-feeding bucket loader at Station J, of the Detroit Gas & Electric Company plant in the nation's fourth largest city.

Big piles of oxide are accumulated from the filter boxes and before this oxide can be used again it has to be turned four times. This is due to the fact that after it comes from the filter boxes, it contains a large amount of tar products which makes it extremely sticky and difficult to handle. Before the installation of the bucket loader all of this work was done by hand, and it is still necessary to do the first turning by hand. Investigation proved, however, that after this first turning the oxide was in such condition that the bucket loader could handle it, and the second, third and fourth turnings are made by the machine. A big saving in labor costs results, as the bucket loader replaces men in the ratio of 5 to 1.

When the machine is operating three men are used. One picks the sticky material loose from the pile, the second man operates the machine and the third man follows behind leveling off the piles. If the material is loaded into wagons, as shown in the photograph below, only 2 men are needed.

Those in charge of the work for the Detroit Gas & Electric Company have figured out that the machine saves from $60 to $84 a day.



YOU CAN'T WORK WITHOUT WATER

Piping System and Pumping Plant Should Be Planned with Great Care

By A. Nydegger

(Continued from the July Issue)

IN the July issue of Successful Methods, the proper equipment for use when the water supply is taken from city mains or roadside springs or creeks was described. In this issue the problem presented to the contractor, who is compelled to dig deep wells, is discussed.

Under this third head of source of supply where wells must be dug, the pumping plant becomes a little more complicated. Many persons not familiar with the fundamental laws of mechanics think that a suction pump can be made to raise water any height in the suction pipe by some special attachment or by some "hocus pocus." If a perfect vacuum could be created in the suction pipe the water would rise approximately 33 ft. However, the practical limit as stated before, is not much over 20 ft., making due allowance for slight leaks. Therefore, when the water in the well is more than about 22 ft. below the surface of the ground it is necessary to drop the pump cylinder down in the well and operate the piston by means of some form of working head on the surface. The cylinder or working barrel should be submerged in the water as it is then always primed. When locating the cylinder, allowance should be made for the drop in the water level in the well when pumping.

An installation of this kind is shown in the diagram on the opposite page. A well not less than 6 in. in diameter should be drilled deep enough to strike an ample supply of water. This should be cased down to the solid rock. The water from the well should be discharged into a tank, and pumped from the tank into the pipe line by a force pump.

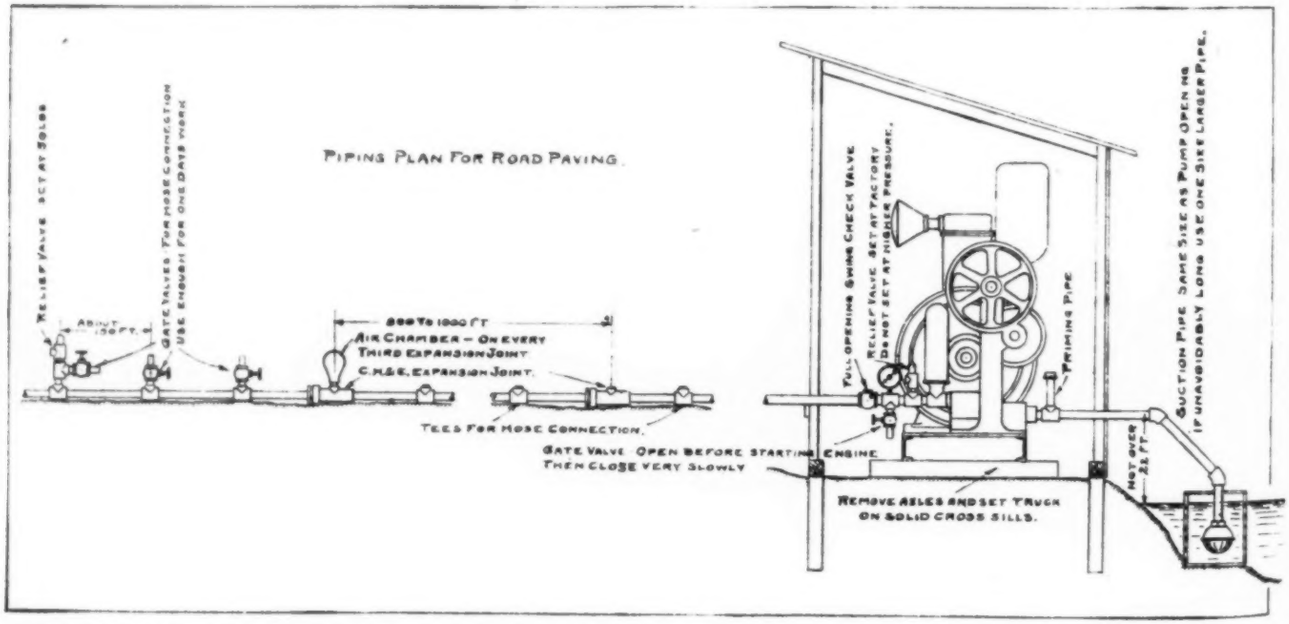
The pipe line which carries the water from the pumping plant to the job, should be given as careful study as the pumping outfit. The first consideration, of course, is the size, and it seems that 2-in. pipe is the ideal size, as this will carry the quantity of water required as far as it is practical to pump in most cases. The friction in smaller pipe would be too great to get the required quantity to any distance and the cost of larger pipe would be prohibitive.

New clean tested pipe free from scale on the inside should be selected and will be found cheapest in the long run. In laying this pipe the average practice is to put in a tee every 150 to 200 ft., and a union about every 500 ft. Some provision must be made for expansion and contraction due to changes in temperature. The importance of this will be readily appreciated from the fact that the expansion and contraction of this pipe is approximately ⅜ in. for every degree change in temperature. This would amount to 15 in. for a temperature change of 40°, which is not uncommon from noon to midnight, especially in the spring and fall. The pipe line often breaks from contraction and buckles from expansion.

Various means are used to overcome this, such as laying a length of pipe zig-zag or putting in a U made of short pieces and ells, every few hundred feet.

An expansion joint will overcome this trouble. This joint consists of a piece of brass pipe telescoping into an iron body through a stuffing box or gland. The pipe line is connected to each end of the joint, which thus becomes a part of the line. An air chamber is used on this joint, although it is not an essential part of it, but is put in to reduce the water hammer and cause a steadier flow of water. These joints should be put in the line 800 to 1,000 ft. apart.

The diagram below shows a complete piping layout

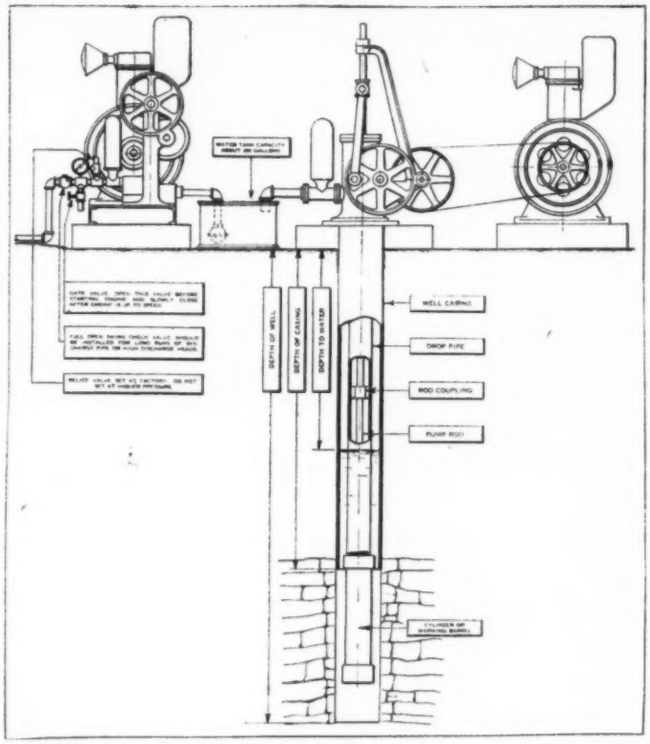

PIPING PLAN FOR ROAD PAVING.
RELIEF VALVE SET AT 50LBS
ABOUT 150 FT.
GATE VALVES FOR HOSE CONNECTION USE ENOUGH FOR ONE DAYS WORK
800 TO 1000 FT
AIR CHAMBER - ON EVERY THIRD EXPANSION JOINT
C.M.&E. EXPANSION JOINT.
TEES FOR HOSE CONNECTION.
GATE VALVE OPEN BEFORE STARTING ENGINE THEN CLOSE VERY SLOWLY
FULL OPENING SWING CHECK VALVE
RELIEF VALVE SET AT FACTORY DO NOT SET AT HIGHER PRESSURE.
PRIMING PIPE
SUCTION PIPE SAME SIZE AS PUMP OPEN NS IF UNAVOIDABLY LONG USE ONE SIZE LARGER PIPE.
NOT OVER 21 FT.
REMOVE AXLES AND SET TRUCK ON SOLID CROSS SILLS.

THIS DIAGRAM SHOWS A PIPING PLAN WITH THE PIPES EQUIPPED WITH EXPANSION JOINTS AND FREQUENT TEES FOR HOSE CONNECTIONS. THE PUMP IN THIS DIAGRAM IS DRAWING WATER FROM A BROOK.

for a road job. The suction pipe should be as short as possible and should have a combination foot valve strainer installed at the end. This strainer should be surrounded by a box or barrel to keep out floating leaves, etc. When taking water from a muddy creek or river, 15 to 20 ft. of large sized sewer pipe should be laid in the bed of the stream and covered over with a layer of gravel and the ends closed. By terminating the end of the suction pipe inside this sewer pipe, the pump will be supplied with clean filtered water.

On the discharge side of the pump the fittings shown next to the pump in the diagram should be installed. The relief valve set at the maximum working pressure of the pump acts as a safety valve and prevents wrecking the pump in case the water is shut off anywhere along the line or the pipe line becomes obstructed. The pressure gauge indicates to the operator whether everything is working normally or not. The swing check valve prevents the water from coming back from the line when the gate valve shown between the check valve and the pump is opened. This gate valve should be opened before starting the engine in order to take the pressure of the line off of the pump. It acts as a clutch so the engine can be easily cranked. After the engine is up to normal speed this valve should be closed slowly in order to start the water in the line moving gradually. A column of water two or three miles long has considerable resistance to motion, so that if this valve were closed suddenly the engine usually would be stalled.

Passing along the pipe line from the pump the illustration shows the plugged tees installed for the hose connections, as well as two of the expansion joints previously referred to, with



A DEEP WELL PUMP. THE PUMP CYLINDER IS SHOWN IN POSITION DOWN IN THE WELL.

and without the auxiliary air chamber. The far end of the line should be closed, and at the point where the mixer is working, enough valves should be installed to take care of one day's movement of the mixer without shutting down the pump to change the mixer hose.

In the evening, after the mixer is shut down, these valves can be moved for the next day's operation. On one of these connections a low pressure relief valve set at 40 to 50 lb. should be installed. This valve will discharge the surplus water between batches when the mixer valve is shut. It will be seen readily that by wasting the water at this point instead of through the relief valve at the pump the velocity of the water in the pipe line will not be checked between batches and the static head will be kept off the pump.

This relief valve can be set at just enough pressure to operate the mixer valve and thus relieve the pump of all unnecessary work. If the relief valve at the pump is depended on to discharge the surplus water the pump will have to work up to maximum pressure whether the mixer is near or far away.

In concluding this article too much stress cannot be laid on the importance of providing for a dependable water supply for the paving job. The most far-sighted contractors realizing how much their profits depend on water are installing duplicate pumping outfits on a job in order to provide against any contingency.

The photograph illustrates a dual plant consisting of two duplicate triplex pumping outfits complete mounted on one truck operating independently They are piped to a common suction and discharge pipe so that either outfit can be cut in or out of service without stopping the water.

A DUAL PLANT, CONSISTING OF TWO TRIPLEX PUMPS MOUNTED ON A SINGLE TRUCK. OWNED AND USED BY A MILWAUKEE CONTRACTING FIRM.

THE ILLINOIS POSITION ON ROADBUILDING

Clifford Older, Chief Highway Engineer, Explains Why New Work Was Not Begun

THE impression that the State of Illinois has deferred its roadbuilding program on account of high prices has gained wide circulation. Clifford Older, Chief Highway Engineer of Illinois, has written to SUCCESSFUL METHODS explaining the situation. His letter is printed herewith, omitting the enclosure which he mentions, because of lack of space:

Editor, SUCCESSFUL METHODS,
Dear Sir:

Your editorial in SUCCESSFUL METHODS of June, 1920, calls for the following information regarding the curtailment of the road building program for Illinois for 1920.

Enclosed is a copy of the order of March 10th and you will note that only one feature of this order is shutting down on account of the high cost of the work and in view of later developments, this is one of the most important.

The movement of materials for those jobs which were held over from last year and which amount to about 400 miles of pavement has developed into the most serious handicap in the construction program. There are today about 85 construction outfits working on contracts under the control of the state highway department and only 50 of these are able to operate at all, due to the shortage of material which is in turn due to a lack of transportation facilities. These 50 outfits are constructing about 2½ miles of pavement each day.

It should be understood that local materials suitable for modern road building are not available in this state. More than ninety-five per cent of the material must be shipped by rail from certain restricted areas. The unfinished contracts Illinois placed in 1919 will require more materials than the railroads will be able to transport this season. We are taxing every railroad involved to the limits of its present car capacity and yet nearly half of our contractors are idle for lack of materials.

A recent order of the Interstate Commerce Commission, effective June 21, prohibiting the shipment of any material in coal cars except in the direction of the mines and only as far as the mines, will cause a still further shortage of material which will mean that more contractors will have to suspend work; therefore, if the state had gone ahead with its program for the construction of an additional thousand miles of highway this year more contractors would have been in competition for material and it would have meant that those contractors who had holdover jobs and were ready to go ahead would not have been able to obtain material in sufficient quantities to make the progress they are now making.

Very truly yours,
CLIFFORD OLDER,
Chief Highway Engineer.

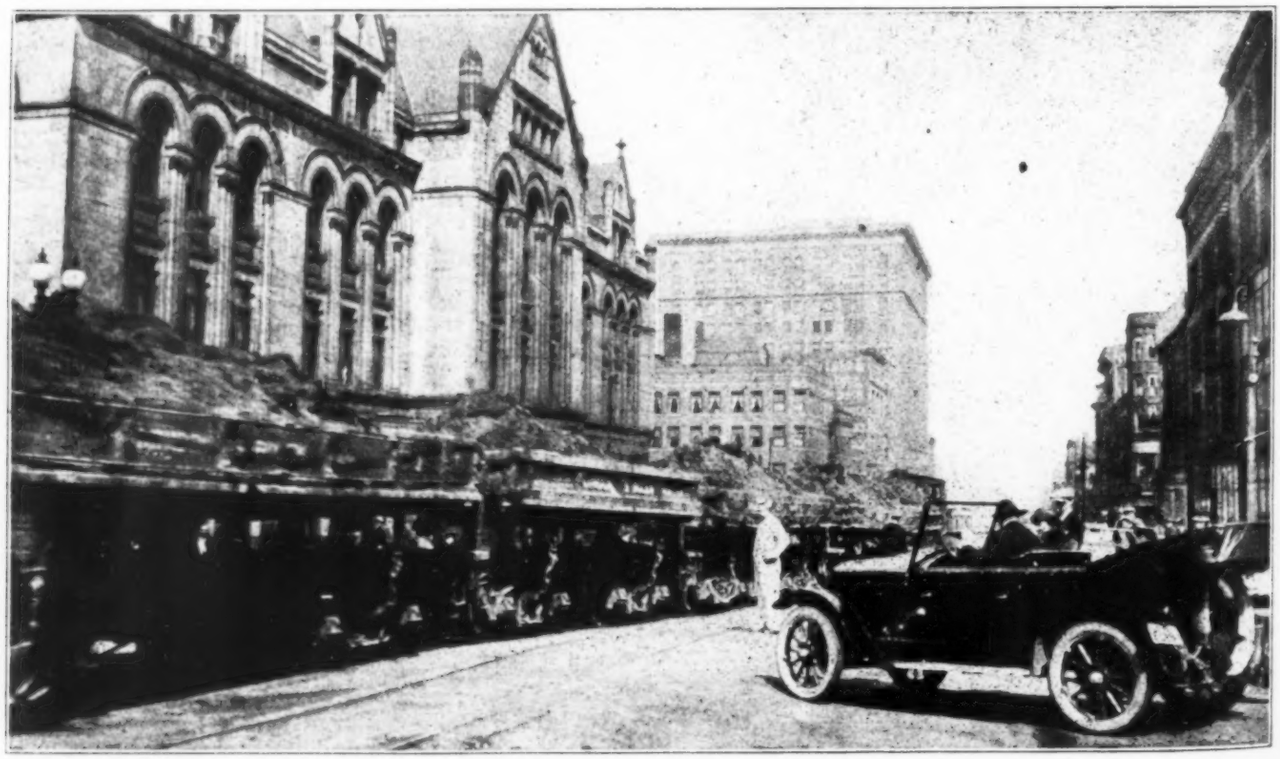
ROLLING THROUGH OMAHA

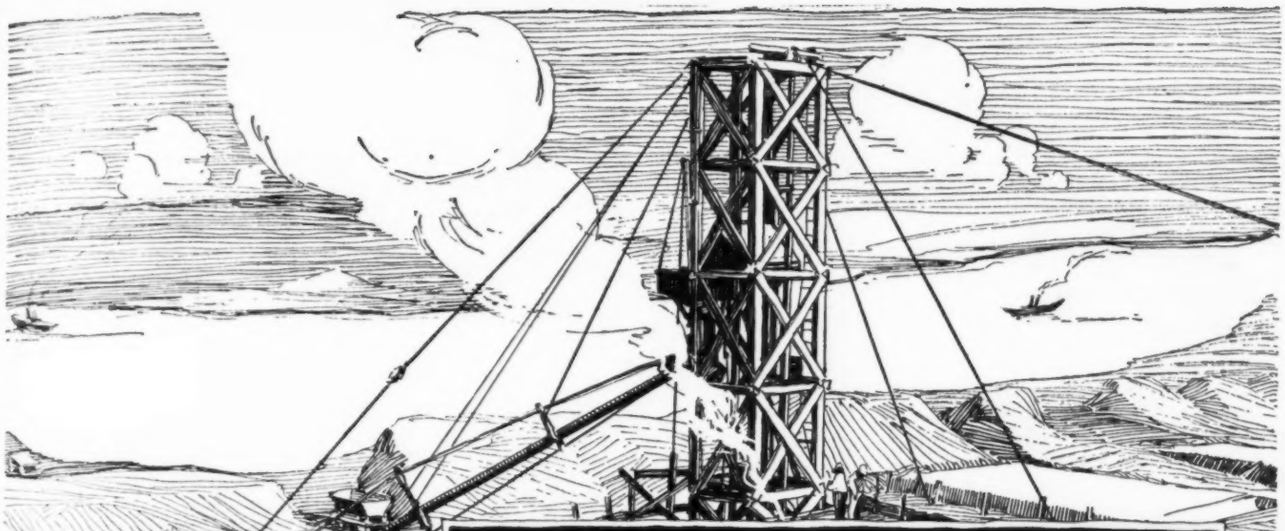
Big Excavation Job Brings 12-yard Dump Cars Into City Streets

THE City of Omaha has seen many strange and interesting sights but never before has it witnessed a train of heavily loaded 12-yd. dump cars passing through the main business streets. The photograph shown was taken while the train was passing the postoffice at the busiest corner of the city.

Omaha is cutting down Capitol Hill, so that Dodge Street will have a maximum grade of 7 per cent instead of 12 percent. The work will require the excavation of 400,000 cu. yds. of material from streets and adjacent property. Many buildings are being torn down and one large church is to be lowered bodily to the new grade 22 ft. below.

Condon & Bolen of Omaha have the contract and are handling it with standard gauge equipment, loading the 12-yd. dump cars with fully 15 cu. yd. of material. The dirt trains are hauled 5 miles and dumped on the Iowa side of the Missouri River.





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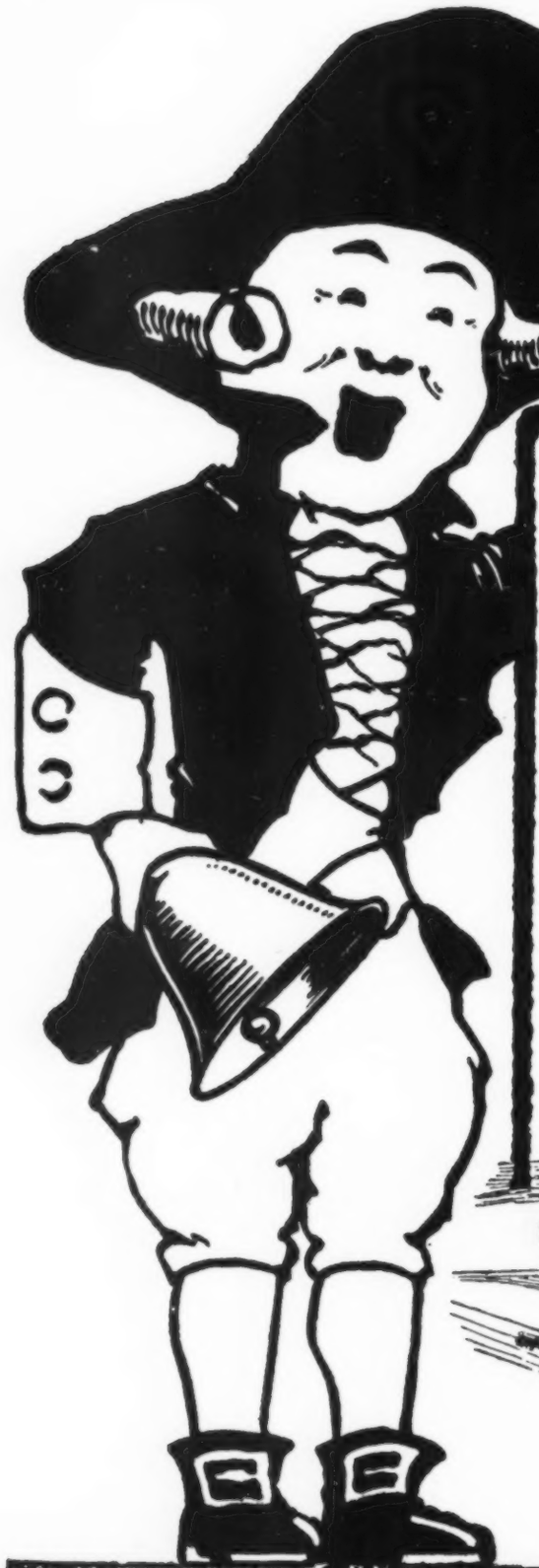

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A Greater

The Thew Shovel Company of Lorain, Ohio, announces that it has succeeded The Thew Automatic Shovel Company.

The new company is an expansion of the old, retaining the principal officers and organization, but with vastly better facilities for serving its customers.

To Thew patrons, this reorganization offers every previous advantage plus:

1—Greatly increased manufacturing facilities to meet the constantly increasing demand for Thew Power Shovels.

THE THEW SHOVEL

New York: 30 Church St.

THEW Power Shovels

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Hear Ye!

Thew Company

2—A higher standard of service to present Thew owners and to new purchasers alike, due to a much strengthened personnel, both in the field and factory organization.

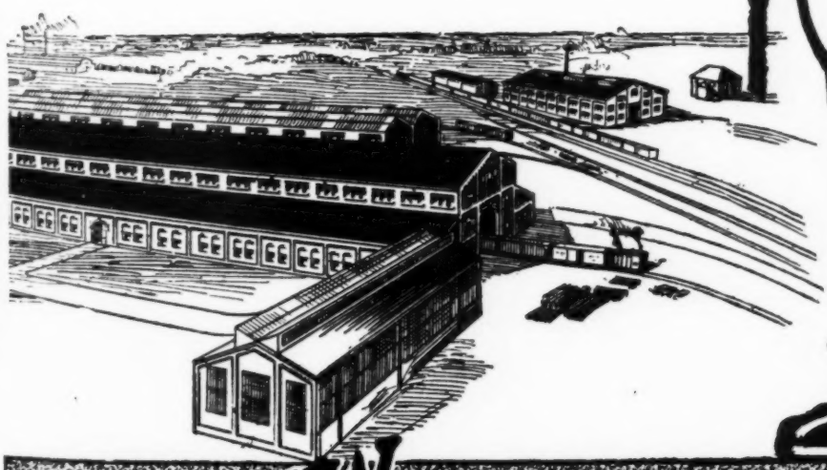
3—The determination to maintain and even exceed the former record of quality, endurance and dependability.

Thus after 26 years, The Thew Shovel stands out now as always—greater than ever before.

To all our friends, new and old, we extend a cordial invitation to visit our greatly enlarged plant at Lorain and to become acquainted with the new members of the Thew family. We are never too busy to visit with you.

COMPANY, Lorain, Ohio

Chicago: Monadnock Building



THEW Power Shovels

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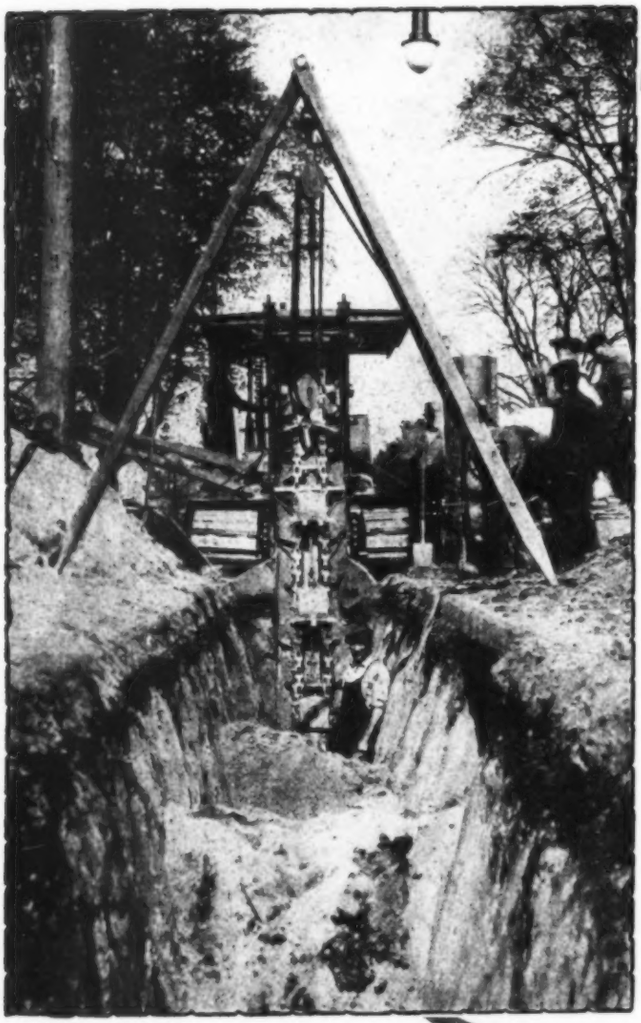
PARSONS

Fifty Cubic Yards of



THIS close-up shows a Parsons Excavator, Model 24, digging a trench for a 16-inch water main to be laid at a depth of seven feet. The material being excavated is running sand, so it was necessary for the Parsons to dig a trench four feet wide to prevent cave-ins. This is supposed to be double the capacity of this model. However, the design of the buckets and the speed at which they run was sufficient to handle the job — fifty cubic yards of material being removed per hour.

This view affords an excellent example of side spudding to prevent serious trouble from cave-ins. Even so, it will be noticed that the loose sand has fallen from underneath the concrete sidewalk and, in the foreground, that it is being used to cover the pipe which was laid as rapidly as possible.

This state of affairs emphasizes the importance of the Parco Traction. Read about it on opposite page.

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We are in a position to make prompt shipments of Parsons' Excavating Equipment

PARSONS

Running Sand Per Hour

Another Fact — After you have picked a Parsons, you stop picking

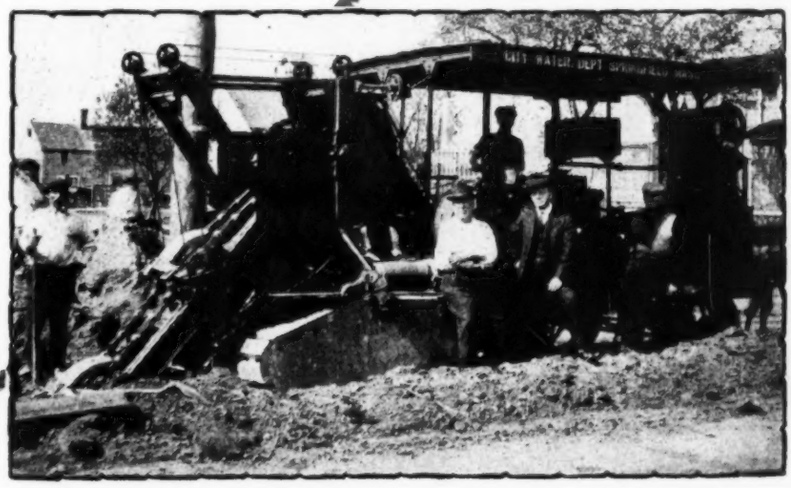
LOOK closely and you will observe that the Parco Traction on one side of the Parsons is traveling along upon the concrete sidewalk. With such loose material underneath—running sand — this would have been dangerous and most certainly destructive to the concrete with anything excepting the Parco.

With a bearing pressure of only 28.6 pounds per square foot, the Parco Traction enables the machine to operate upon the sidewalk without damaging it in the least. With a heavier machine the bearing pressure would have been decidedly unsafe.

This interesting and instructive operation occurred at Springfield, Mass., and the photographs were taken this last May 15th. The machine is owned by the Water Department of the City of Springfield—which has quit picking after picking a Parsons.

Write us about your trenching problems and soil conditions. We will advise you relative to proper equipment. There is a a Parsons machine to fit your job.

BELOW is an excellent side view of the machine in the same position as shown on opposite page. The men in front of the Parsons are (on the left) Foreman T. B. Greeley; (in the center) Mr. H. M. King, Asst. Supt. Springfield Water Dept.; and (on the right) Ed. Rose, official truck driver for the Springfield, Mass., Water Dept. In the background is Operator J. W. Brooks.



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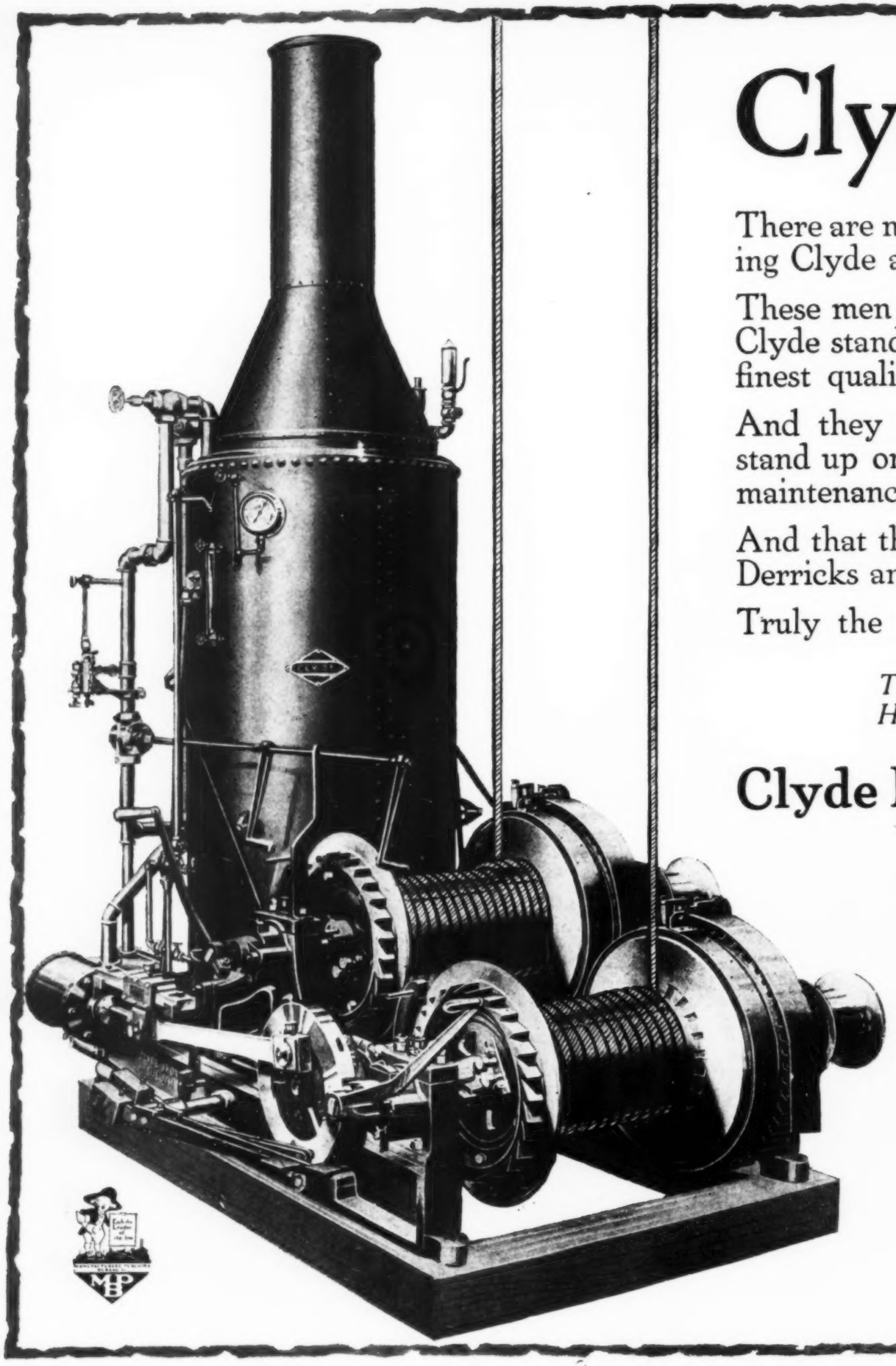
We are in a position to make prompt shipments of Parsons' Excavating Equipment



Clyde

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Hoisting Equipment is complete—
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become a National Symbol.

—a comprehensive book of Derricks,
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Sales Company

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WORKS
U. S. A.

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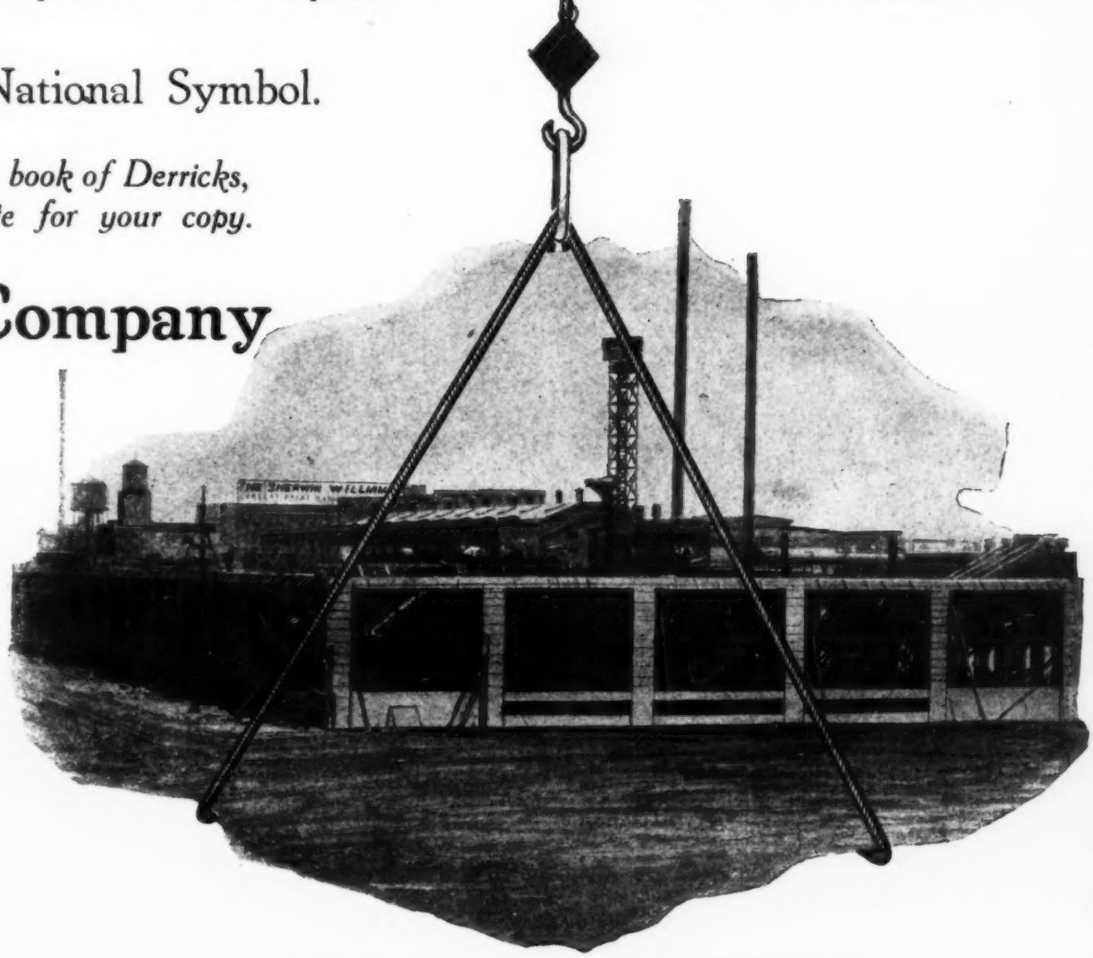
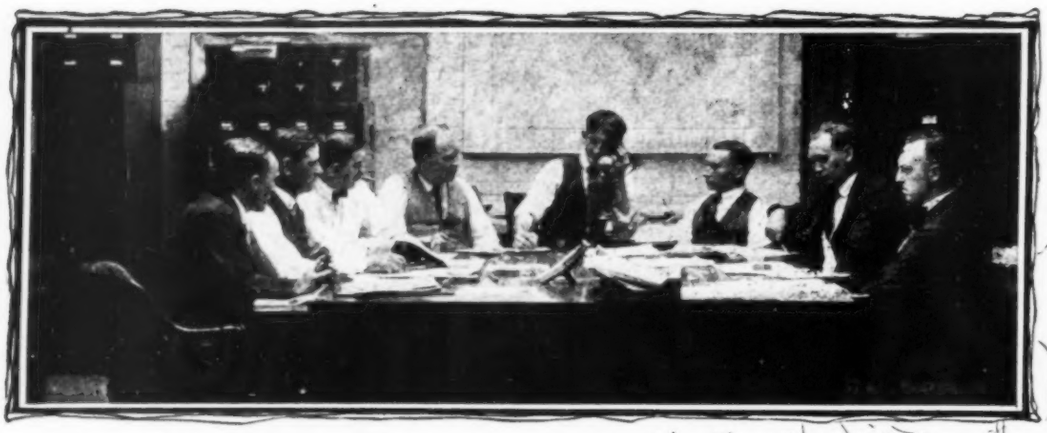
CLYDE

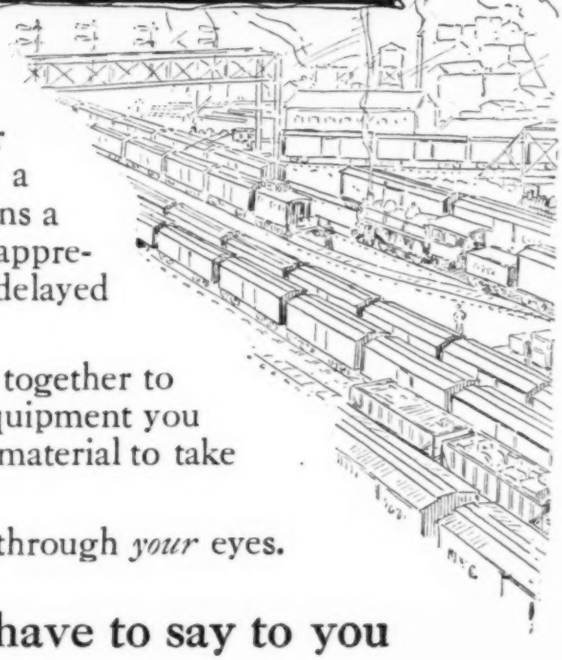
The new addition to the Sherwin - Williams Company's factory at Pullman, Illinois is one of the big jobs where Clyde Equipment is used. The contractors, E. P. Stranberg Company, are among the large list who standardize on Clyde.



EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
51 Chambers St., New York, U.S.A. Cables: Almacoa, New York

YOUR JOB IS





AT Lakewood a No. 14 Mixer brings to us a job that will be ready for concrete soon. An order for a Sub-grader means a road job. A Tier-Lift order, a manufacturer to whom the machine means a daily saving. We have, therefore, a keen appreciation of how costly to the customer delayed shipments of machines may be.

Every afternoon at four o'clock we get together to consider how best to get to you the equipment you need—how best to insure delivery of raw material to take care of future orders promptly.

Your job is *our* job. We see the job through *your* eyes.

Hear what our boys have to say to you

"In spite of obstacles, we are producing and shipping more equipment than ever before in our history. Sometimes we cannot prevent delays in railroad movements. Shortages of material cause unavoidable delays in production. When we fail to keep a production promise it is because of obstacles which we could not overcome. No effort is too great—no expenditure too large—to get the best results for our customers."

FRANK MICHELL
Assistant Production Manager

"The receipt of an order is only the beginning of Lakewood's obligation to its customers. We must do everything in our power to place the customer's equipment on the job at the time specified, so that his work can go forward without hindrance."

BOB WELLER
Assistant General Sales Manager

LAKEWOOD BUILT TO LAST

NEW YORK CITY
BOSTON
PHILADELPHIA
RICHMOND

DISTRICT OFFICES
MEMPHIS
ATLANTA
DALLAS
HOUSTON

MILWAUKEE
CHICAGO
ST. LOUIS
INDIANAPOLIS

Lakewood

THE LAKEWOOD ENGINEERING

ALWAYS OUR JOB

"Our volume of business is seven times what it was a few years ago. By continuous additions to our manufacturing facilities, and by careful planning, material goes into production almost as soon as it reaches the plant. In spite of the tremendous increase in volume, we have maintained Lakewood "Built to Last" quality by good workmanship and thorough inspection. We honestly endeavor to give customers dependable machinery without delay."

FRANK FLEMING, Superintendent

"Nobody needs to be told about present day traffic conditions—how long it takes shipments to reach destination—how hard it has been to get cars—how impossible to get quick express shipments. Only by never ending effort—by the almost unbelievable achievement of our boys—have we kept a steady stream of shipments going out by freight, by truck and by express. Our store yards are empty—indisputable evidence that our boys here have done their jobs well—done their best to help us keep promises to customers."

ALEX DENHOLM, Traffic Manager

"To insure prompt shipments of completed machines we must have a steady supply of raw materials. Otherwise we're going to fall down on a promise and some job will be held up. One of our biggest jobs is seeing that the stuff we buy gets to us. We are continuously sending our own men out to hurry up and follow through incoming raw material."

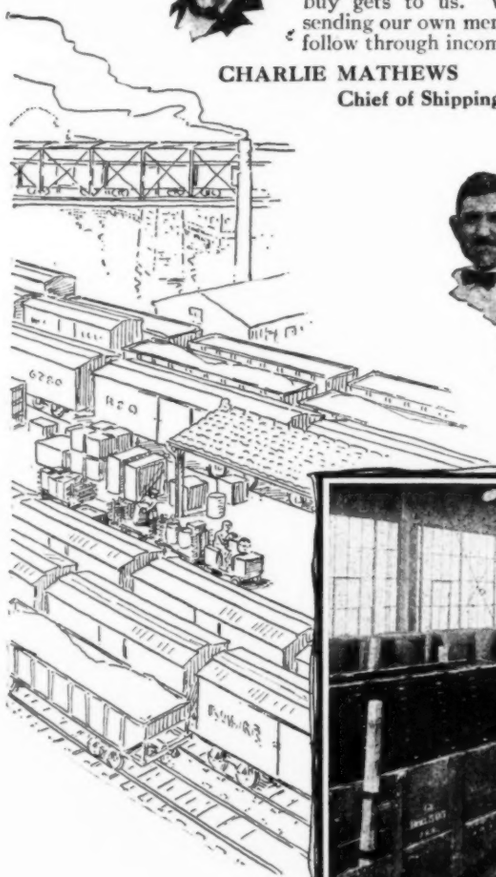
CHARLIE MATHEWS
Chief of Shipping Schedules

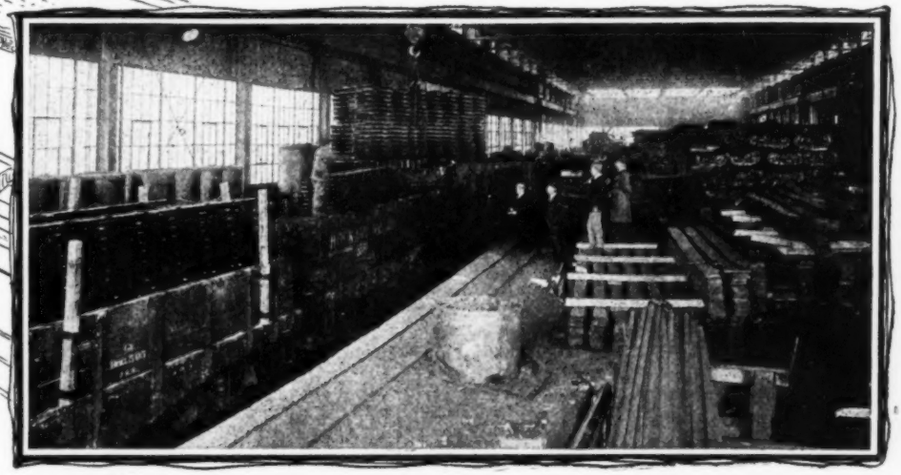
"More orders on our books than we *ever* had—and fewer complaints of delayed deliveries. That's a big story in a nutshell—and it's the truth."

HAROLD TITUS
Chief of Order Department

"We try to look at the job through our customer's eyes. If we can't ship his entire order at once we send that part which he will need first and keep the rest of it going to him as fast as possible. Never have we tried harder to live up to the Lakewood motto of maximum service to the customer."

PAYNE WEST
Business Manager, Sales Dept.





EXPORT DEPARTMENT
ALLIED MACHINERY COMPANY OF AMERICA

MINNEAPOLIS
DES MOINES
PITTSBURGH
CLEVELAND

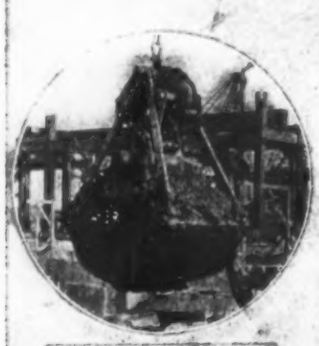
DISTRICT OFFICES
BUFFALO
DETROIT
KANSAS CITY

SAN FRANCISCO
LOS ANGELES
PORTLAND
SEATTLE

Industrial Haulage
Road Plant
Construction Plant

COMPANY, CLEVELAND, U. S. A.

Nothing too



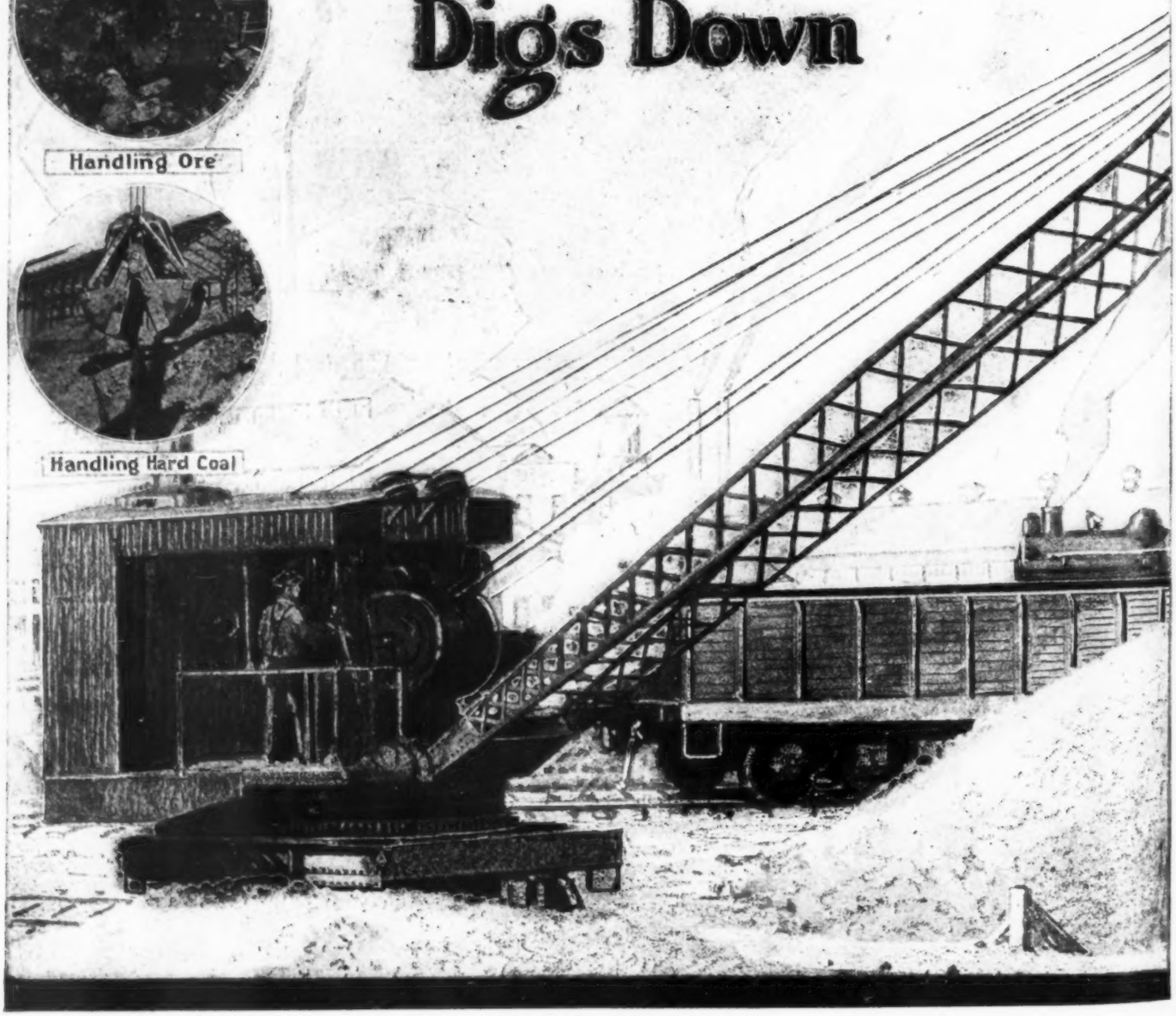
Handling Slag

Handling Slack Coal

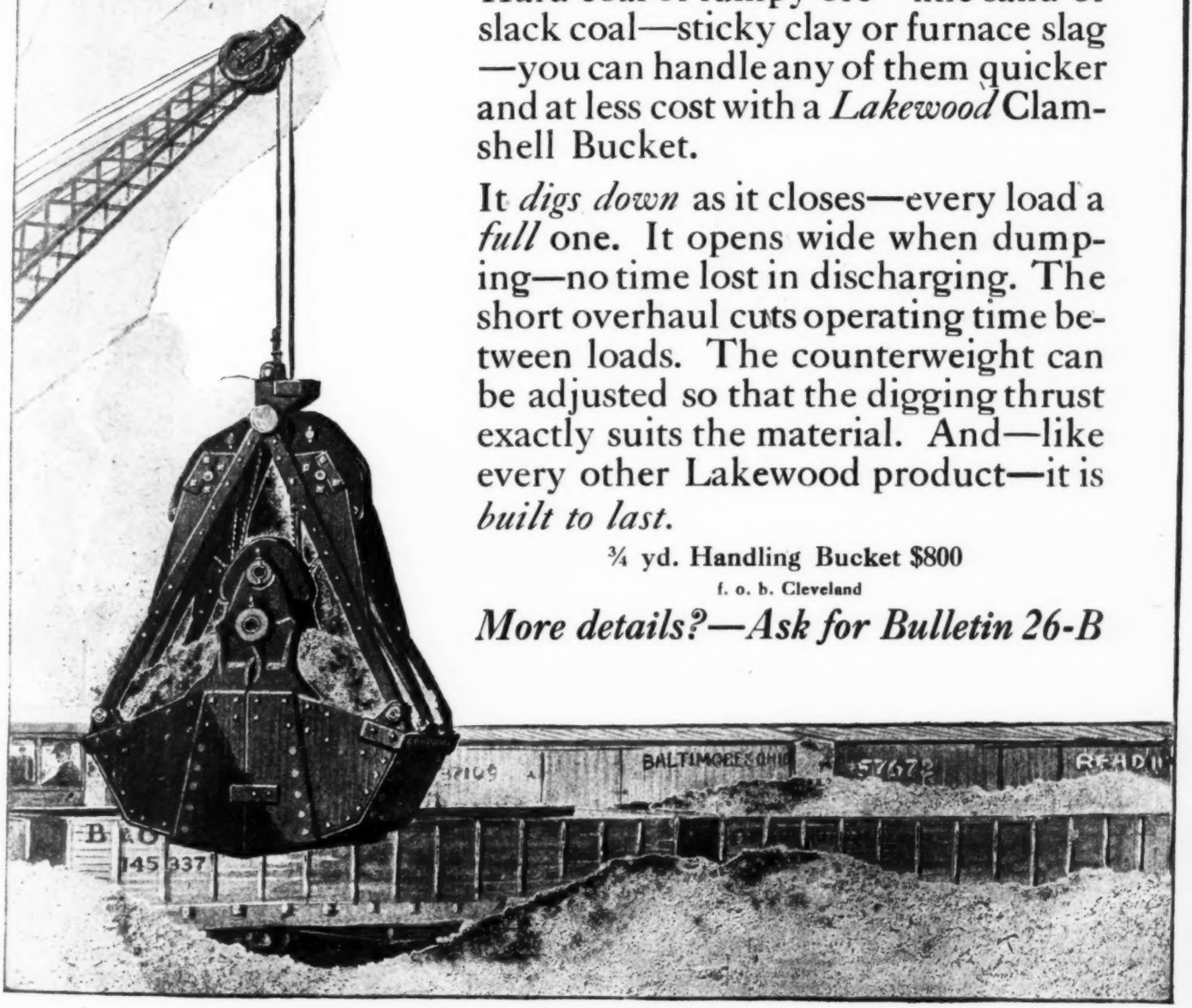
The Bucket that Digs Down

Handling Ore

Handling Hard Coal



Hard for a Lakewood Clam Shell



Hard coal or lumpy ore—fine sand or slack coal—sticky clay or furnace slag—you can handle any of them quicker and at less cost with a *Lakewood* Clam-shell Bucket.

It *digs down* as it closes—every load a *full* one. It opens wide when dumping—no time lost in discharging. The short overhaul cuts operating time between loads. The counterweight can be adjusted so that the digging thrust exactly suits the material. And—like every other Lakewood product—it is *built to last.*

¾ yd. Handling Bucket $800

f. o. b. Cleveland

More details?—Ask for Bulletin 26-B

DISTRICT OFFICES

NEW YORK CITY, BOSTON, PHILADELPHIA, RICHMOND, MEMPHIS, ATLANTA, DALLAS, HOUSTON, MILWAUKEE, CHICAGO, ST. LOUIS, INDIANAPOLIS, MINNEAPOLIS, DES MOINES, PITTSBURGH, CLEVELAND, BUFFALO, DETROIT, KANSAS CITY, SAN FRANCISCO, LOS ANGELES, PORTLAND, SEATTLE

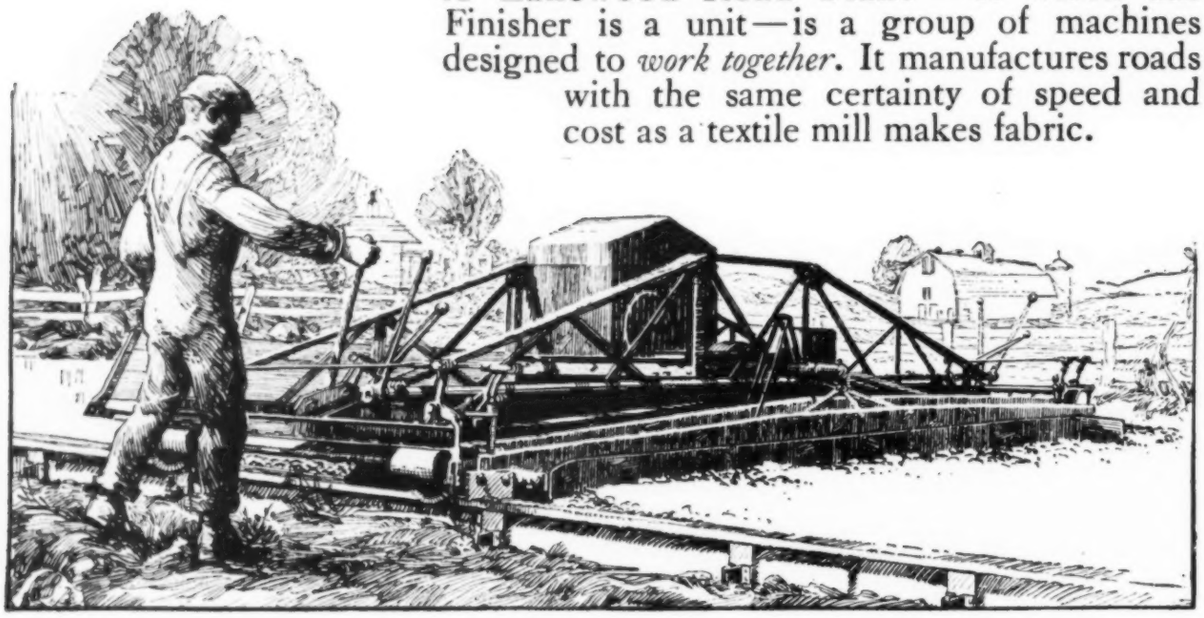
LAKEWOOD BUILT TO LAST

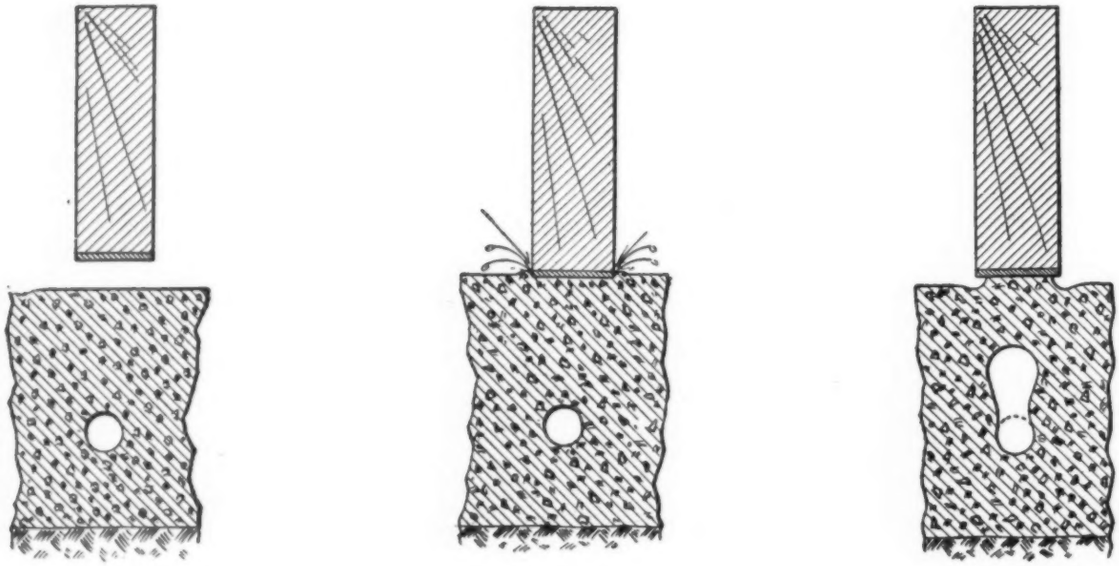
Lakewood Industrial Haulage Construction Plant Road Plant

THE LAKEWOOD ENGINEERING COMPANY, CLEVELAND, U.S.A.

The Story of

A Lakewood Road Plant — of which this Finisher is a unit — is a group of machines designed to *work together*. It manufactures roads with the same certainty of speed and cost as a textile mill makes fabric.





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CHICAGO
ST. LOUIS
INDIANAPOLIS

Lakewood

THE LAKEWOOD ENGINEERING

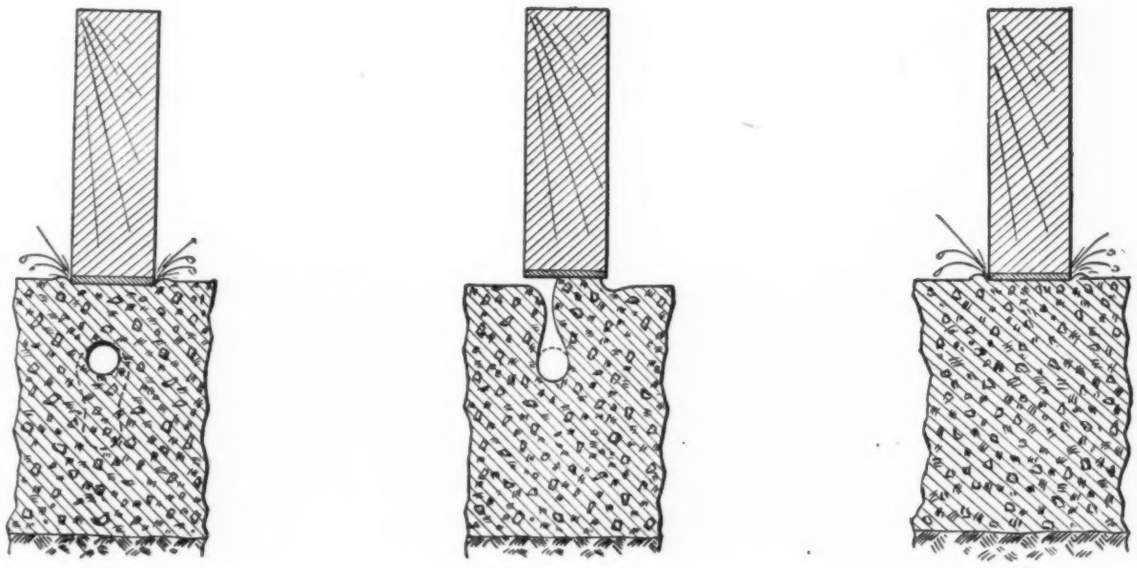
An Air Bubble

THE "Movie" below shows how the Lakewood Road Finisher removes air-bubbles from concrete by continuous agitation of the mixture. The "tamping member" works the concrete until every air-bubble is removed. This action practically remixes the concrete, thus giving more perfect hydration and a denser mixture.

Finishing roads the Lakewood Way—with a Lakewood Road Finisher—means quicker work—less labor cost—and a better job.

Why not a Lakewood Finisher on that road job of yours? Write for full details—today.

Price of 18-ft. machine $1800, F. O. B. Cleveland



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PITTSBURGH
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KANSAS CITY

SAN FRANCISCO
LOS ANGELES
PORTLAND
SEATTLE

Industrial Haulage
Road Plant
Construction Plant

COMPANY, CLEVELAND, U. S. A.

Sterling STERLING ON A WHEELBARROW MEANS

Sterling Wheelbarrow Company

NEW YORK
BOSTON
CLEVELAND

MILWAUKEE, WIS.

DETROIT
CHICAGO
ST. LOUIS

CANADIAN AGENTS-MUSSENS LIMITED, MONTREAL, TORONTO, WINNIPEG, VANCOUVER

EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA